Annual AVMA Meeting
Detroit, Michigan
August 20-24, 1961

Journal

OF THE
AMERICAN VETERINARY MEDICAL ASSOCIATION

Detroit's skyline with Cobo Hall in the foreground. The Ninety-Eighth Annual Meeting of the AVMA will be held here, Aug. 20-24.

Vol. 138 March 1, 1961 No. 5

Safety and rapid response assured with

TEMPACINE™

CANINE DISTEMPER VACCINE, TISSUE CULTURE ORIGIN, MODIFIED LIVE VIRUS

TEMPACINE Canine Distemper Vaccine stimulates immunity so rapidly that vaccinates can withstand severe challenge in one to three days. TEMPACINE is safe. None of the vaccinates used in CS tests showed signs of disease or severe reaction. None of the susceptible dogs or ferrets kept in pen contact with vaccinates became diseased or acquired immunity. Dogs vaccinated by practitioners in trials throughout the U.S. developed titers indicating solid immunity as measured by the Cornell canine serological standards.

TEMPACINE, a tissue culture, modified vaccine made from the most antigenic virus strain available, is desiccated for stability. It is now stocked in plastic cartons of 5 single-dose vials (2 cc. each) with diluent at all CS distribution points.

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Ah, but I need protection against both Lepto serotypes!

LEPTO
BACTERIN . . .

immunizes against two serotypes

Leptospirosis—common disease in dogs and transmissible to man—usually is caused either by Leptospira canicola or Leptospira icterohemorrhagiae. A single 5 cc. dose of Norden Bacterin produces a rapid, high immunity response against both organisms.

When small animal patients are submitted for rabies vaccination,* do your clients and their pets a professional service by recommending simultaneous immunization with new Leptospira Canicola—Icterohemorrhagiae Bacterin (Norden).

Supplied in: 10-5 cc. and 50 cc.

*Norden rabies vaccine is recommended, either Killed Virus, Caprine Origin or Live Virus Modified, Chick Embryo Origin.

Leptospira Canicola--Icterohemorrhagiae Bacterin

Norden

NORDEN LABORATORIES, INC.
LINCOLN, NEBRASKA,

Journal

OF THE
AMERICAN VETERINARY
MEDICAL ASSOCIATION

Vol. 138 No. 5 March 1, 1961

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Correspondence

Feedlot Bloat

Dec. 31, 1961

Gentlemen:

It should be pointed out, in reference to the article "Feedlot Bloat" in the November 1 JOURNAL, that the observed lesions of esophagitis and rumenitis may have had nothing to do with the cause of the bloating.

In a debilitated bovine animal, severe esophageal inflammation can occur due to repeated passage of a stomach tube. I cannot accept the existence of esophagitis in 11 calves on the basis of examination of the esophagus of only 1.

Is it not likely that both the accumulation of gas (due to rumen atony) and the rumenitis were caused by other factors such as rumen pH alterations, histamine production, etc.?

In reference to the article "Thallium Intoxication in Dogs" in the same issue, I think that when an unusual drug such as diphenylthiocarbazone is used, the method of administration and source of supply should be mentioned in the article.

s/C. A. HJERPE, D.V.M.
Torrington, Conn.

[EDITOR'S NOTE: Availability of unusual drugs such as diphenylthiocarbazone is customarily listed in a footnote. It was omitted inadvertently from this report. Diphenylthiocarbazone is available from Eastman Organic Chemicals, Distillation Products Industries, Rochester 3, N. Y. (Division of Eastman Kodak Company).]

Jan. 23, 1961

Dear Sir:

In the absence of any other explanations that would conform with more recent physiologic and pathologic findings, we would be unable to agree with Dr. Hjerpe that the lesions of esophagitis or rumenitis may have had nothing to do with the cause.

Diligent search for the cause of bloat in young feedlot cattle in which foam was absent failed to produce satisfactory answers until the existence of the 2 esophageal sphincters and some of the afferent nerve control mechanisms was established. Inflammation of the cardia region of the paunch, which contains the afferent nerve endings that influence the posterior sphincter, provided a helpful explanation for the deranged nerve controls and the associated bloat. When grain feeding and rumenitis were not concerned, inflammation involving the nerve controls

(*Continued on adv. p. 6*)

CONTENTS—*continued*

ITEMS

from the RESEARCH JOURNAL

NEW BOOKS

NEWS

BREAK THROUGH THE EARWAX BARRIER WITH SEBUMSOL™

(hexamethyltetracosane, 'PARLAM')

□□□ ideal new cerumenolytic agent

Only 1 dropperful of a safe, new drug now offers greater success in ear diagnosis and therapy. Called 'SEBUMSOL', it provides deep penetration of waxy deposits and thoroughly cleans the ear canal without irritation.

'SEBUMSOL' cleans better because it mixes so freely with sebaceous and cerumenous secretions. Loosens and dissolves hard, deep-seated wax and fatty deposits; floats them to the surface where they can be quickly and easily wiped away.

Traditional cleansing agents employ foreign materials that attempt to perform by chemical or mechanical action. 'SEBUMSOL' relies entirely on its natural physical action for its therapeutic activity.

In recent controlled tests on 550 dogs and cats, 95% good to excellent results were obtained with easy to use 'SEBUMSOL.'

Non-irritating, non-allergenic, non-anaphylactic. No residue. No hair discoloration. Completely safe.

□□□ without anesthetics or instruments

INDICATIONS:

(1) **Removes excess or impacted earwax.**

(2) **As a pre-treatment. Removes "cerumen barrier." Enhances effectiveness of any additional therapeutic measures.**

(3) **Cleans the ears; facilitates aural examination and diagnosis.**

(4) **Relieves otitis externa, itching and pain, due to excessive cerumen.**

SUPPLY: 'SEBUMSOL' is available in 1 fl. oz. dropper bottles with dispensing label; also pint bottles for hospital use. **Low priced for routine use.**

'SEBUMSOL' complements . . . does not complicate any additional therapy which may be required.

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Write for samples and literature.

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CANADA: Veterinary Medical Supply Co. of Canada, 4700 Prince of Wales, Montreal

"Pioneer in veterinary medicine for target point chemotherapy"

(Correspondence — continued from adv. p. 4)

of the anterior sphincter came into the picture. Previously, in trying to understand animals in the latter category, the possibility was considered that the frequently-encountered swollen retropharyngeal lymph nodes were somehow involved.

Certainly there was no possibility of the bloat being caused by lesions due to passage of the stomach tubes, because the bloat occurred first. Besides, when the procedures for tube passage are carried out as described, the tubes are not forced in but are swallowed by the animals, therefore, lesions do not result in either debilitated or healthy animals.

Inclusion of more cases, of course, would have been advantageous. However, to delay making the information available did not seem desirable because already it provides help in making differential diagnoses and in devising more rational approaches to treatment and control.

s/W. D. POUNDEN, D.V.M.
Wooster, Ohio

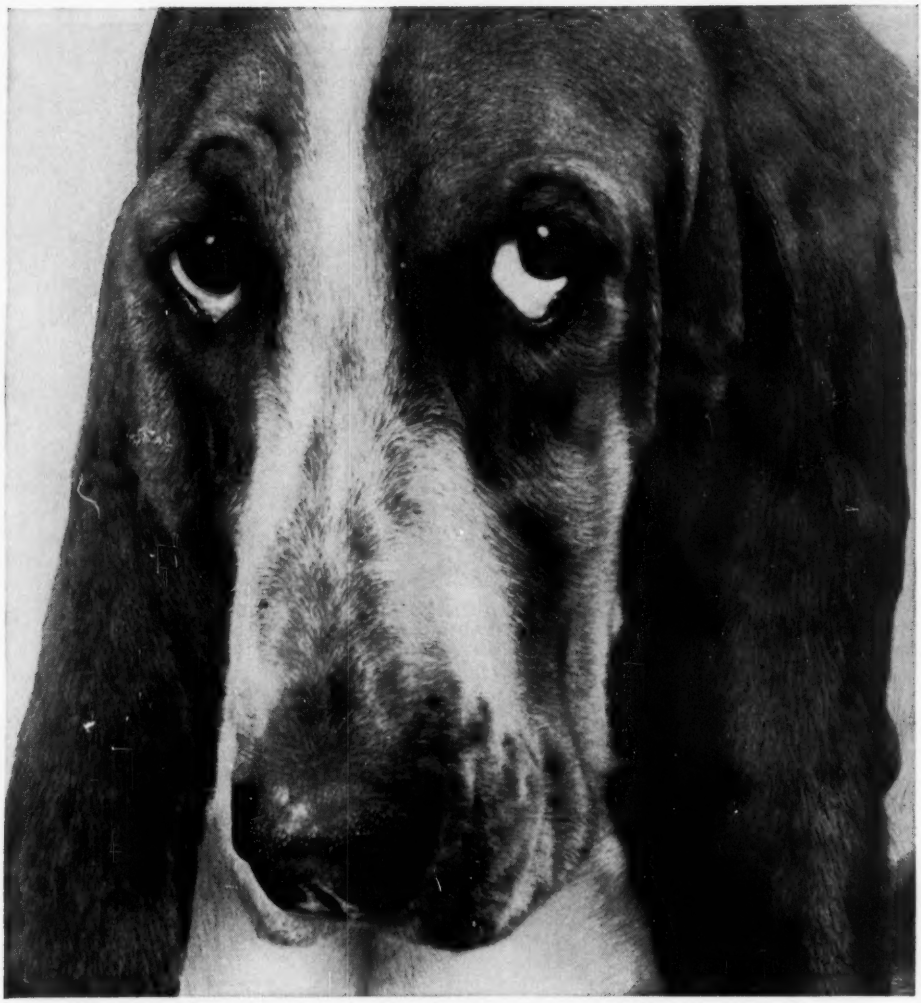
"Colon" Straightened Out

Jan. 23, 1961

Dear Sir:

In the article "Colostomy for Repair of Atresia of Anus and Rectum in a Pig" which appeared on pages 20 and 21 of the Jan. 1, 1961, J.A.V.M.A., the use of certain anatomical terms is confusing. Reference to "the last and most dorsal turns of the transverse colon (colon descendens)" is inaccurate. The transverse colon is a short segment hooked around the cranial mesenteric artery. It could not be drawn into the left flank. It is continuous with the descending colon, but the 2 terms are not synonymous. The transverse colon has only one turn—from right to left. The descending colon makes no turns. The spiral colon is the ascending colon.

s/ROBERT E. HABEL, D.V.M., M.SC.
New York State Veterinary College
Department of Anatomy
Cornell University
Ithaca, N. Y.



Gee, we're sorry, but we just can't seem to make Gravy Train fast enough!

We knew feeders would take to new Gaines Gravy Train, but not so quickly and in such great numbers. So, you may have had some trouble finding Gravy Train in the size you want. Sorry! We're working around the clock seven days a week, though, and a big increase in capacity will help us to catch up very soon. Meanwhile, thanks for your patience!

Gravy Train: World's only dog food that makes its own gravy!

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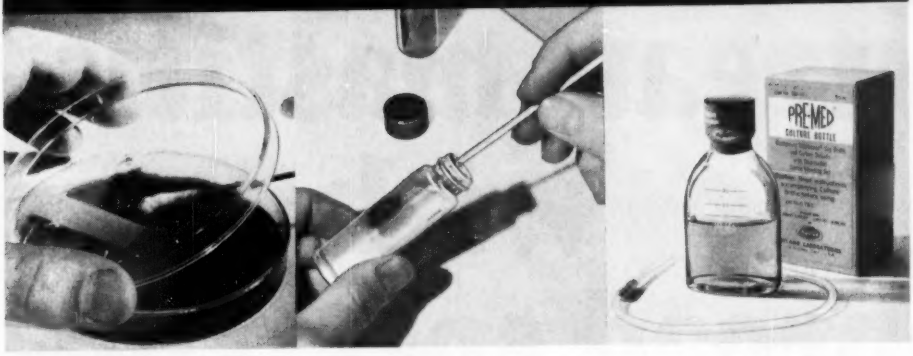

PRE-MED

Disposable Culture Plates in Individual Sterile Bags*

With these ready-to-use Mono-Plate® culture plates (plastic petri dishes containing prepared media) you are always ready to streak fresh specimens—no matter how many miles you may be from your laboratory. Just open sterile outer bag, lift plastic cover and streak agar with specimen. Read when incubation is complete, then destroy. Particularly useful in diagnosis of mastitis, infected wounds, fungus infections. Plates remain usable for months under normal refrigeration.

Supplied in a wide variety of wanted media. Fifty cents per plate in minimum quantity of 3 plates; lower cost in quantity.

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The modern way to collect and culture blood and body fluids. Bottles contain 50 cc Trypticase† Soy Broth with CO_2 added, a medium capable of revealing bacterial growth in its earliest stages. Specimens may be collected aerobically or anaerobically to detect a wide range of microorganisms. Unopened bottles store at room temperature.

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†Trypticase is a trademark of Baltimore Biological Laboratory, Inc.

Hyland

Send for complete list of PRE-Med culture plates and culture products.

Available through your veterinary supply dealer or direct.

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New Mastalone treats mastitis with broad spectrum in depth

Supplies the unusually wide-range antimicrobial activity of oxytetracycline

Contains oleandomycin and neomycin for added depth of treatment and for activity against organisms that may be resistant to penicillin or streptomycin

Reduces inflammation with prednisolone, which is three times as effective as hydrocortisone

Contains no penicillin

Almost all of the common types of the bacterial pathogens causing bovine mastitis can be treated effectively with new Mastalone.

Its unique combination of antimicrobial and anti-inflammatory agents supplies *true* broad-spectrum treatment in depth . . . in a formulation available only to veterinarians. It promotes increased effectiveness in treating most types of mastitis commonly encountered by the veterinarian today.

True broad spectrum

It offers the unusually wide-range activity of effective, time-proven oxytetracycline hydrochloride.

Added depth of spectrum

Mastalone contains neomycin . . . an antibiotic that exhibits the same general coverage of organisms as streptomycin . . . yet with wider spectrum. And neomycin also demonstrates effectiveness against streptomycin-resistant organisms. It is particularly effective against Proteus and Pseudomonas.

Combats penicillin-resistant organisms

New Mastalone contains no penicillin. Instead, it is formulated with oleandomycin—one of the newest antibiotic agents—developed specifically to help combat strains of staphylococci and streptococci which may be resistant to other narrow-spectrum antibiotics.

Potent anti-inflammatory activity

Prednisolone is provided to reduce tissue inflammation. This corticosteroid is three to five times more potent than hydrocortisone and shows significantly fewer side effects.

See your Pfizer representative for complete details.

Supplied in 10-cc. tubes, Mastalone contains:

- 200 mg. of oxytetracycline (as hydrochloride).
- 100 mg. of oleandomycin base.
- 100 mg. of neomycin (as sulfate).
- 5 mg. of prednisolone (Sterane®).
- Special base, Q. S.

Warning: Milk taken from dairy animals within 72 hours after treatment for mastitis should not be used for food.

Sold only to veterinarians.

Department of
Veterinary Medicine
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MASTALONE®

Brand of oxytetracycline hydrochloride, oleandomycin, neomycin sulfate, prednisolone (Sterane®) in a special base.

SQUIBB – A NAME YOU CAN TRUST

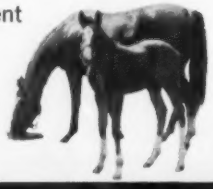
improve health, vigor, stamina and appearance of

ALL HORSES ALL AGES ALL BREEDS...

with

Vionate-L

Squibb's new HIGH POTENCY vitamin and mineral supplement



Vionate-L provides the equine practitioner with a dependable source of 18 essential vitamins and minerals horses need to develop stamina and staying power. Grains and grasses often lack these essential vitamins and minerals or lose them in storage. **Vionate-L** is the long awaited answer to the problem of keeping valuable horses in prime condition through proper feeding. **Vionate-L** helps build good bone, prevents rickets and is particularly beneficial for the brood mare to provide bone-building calcium, phosphate and vitamin D. **Vionate-L** is especially "Palatized"® to appeal to your horse's sense of taste and smell, and "pelletized" for convenience and easy use.

We will be glad to supply you with our comprehensive booklet on equine nutrition—simply write: SQUIBB, *Veterinary Dept.*, 745 Fifth Ave., N. Y. 22, N. Y.

Pellets of Vionate-L are slightly larger than oats, the ideal size, shape and crunchiness. Horses will not "snort" it away.

Vionate-L is packaged in 2-lb. and 5-lb. canisters, each containing handy 1-oz. measuring cup.

"Vionate"@ and "Palatized"@ are Squibb trademarks.

SQUIBB

SQUIBB – A NAME YOU CAN TRUST

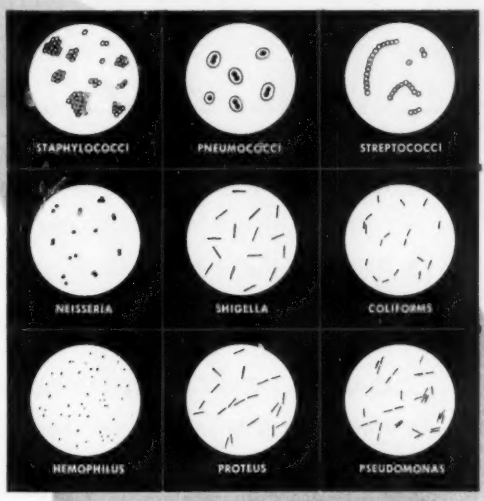
Only NEOTHION

provides effective control of all 9 of these MASTITIS *-causing bacteria*

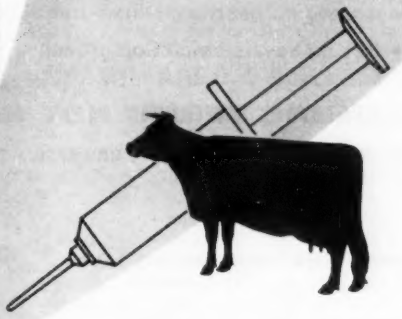
Neothion contains the new Squibb antibiotic, *thiostrepton,* plus neomycin. This exclusive Squibb formula controls all nine types of mastitis-causing bacteria, including strains which have become resistant or immune to other antibiotics which have been extensively used for this purpose. You can administer Neothion with the confidence that this one product provides fast, dependable, economical anti-mastitis therapy.

Neothion offers you a "triple-control" formula:

1. **THIOSTREPTON**. Isolated by the Squibb Research Laboratories, this new antibiotic possesses a remarkably higher order of activity against gram-positive cocci.
2. **NEOMYCIN**. A highly effective adjuvant to thiostrepton. Together these two antibiotics offer you a broader range of antibacterial activity than any single antibiotic now available for intra-mammary administration.
3. **PLASTIBASE**. A free-flowing ointment base which possesses unique physical and therapeutic advantages. Smooth, homogenous and colorless, Plastibase is remarkably stable over a wide temperature range. Because of its unusual molecular structure, Plastibase tends to "cling" to udder tissue and readily releases its antibiotic medicants. Plastibase does not milk out prematurely.



COMPARISON OF ACTIVITY OF SPECTRUM	GRAM POSITIVE BACTERIA			GRAM NEGATIVE BACTERIA					
	1 STAPHYLOCOCCI	2 PNEUMOCOCCI	3 STREPTOCOCCI	4 NEISSERIA	5 SHIGELLA	6 COLIFORMS	7 HEMOPHILUS	8 PROTEUS	9 PSEUDOMONAS
Triple Sulfas	■	■	■	■	■	■	■	■	
Penicillin	■	■	■	■				■	
Streptomycin			■	■	■	■	■	■	
Neomycin	■		■		■	■	■	■	■
Brand A BROAD SPECTRUM ANTIBIOTIC	■	■	■	■	■	■	■	■	
Brand B BROAD SPECTRUM ANTIBIOTIC	■	■	■	■	■	■	■	■	
Brand C BROAD SPECTRUM ANTIBIOTIC	■	■	■	■	■	■	■	■	
NEOTHION	■	■	■	■	■	■	■	■	■



–The chart above lists 9 organisms known to cause mastitis. Solid red squares indicate effective mastitis control. *Note that only Neothion is effective against all nine.*

Light red squares indicate the widely demonstrated fact that staphylococci have built up a resistance to most antibiotics and sulfas now in use. Staphylococci are among the chief causative agents of mastitis. *Note that only Neothion controls resistant strains of staphylococci.*

Neothion controls both chronic and acute mastitis with a broader spectrum of antibacterial activity than either of the three brands of broad spectrum antibiotics, the triple sulfas, penicillin, streptomycin or neomycin when used alone. Neothion was developed to provide the veterinary profession with an anti-mastitis preparation which is fast, thorough and safe at low dosage levels.

Disposable plastic syringe permits you to instill Neothion with a single quick thrust of the thumb.

NEOTHION IS SOLD ONLY TO VETERINARIANS **and is available from your Squibb branch or your ethical wholesaler. Neothion is supplied in 1-dose syringes containing 50,000 units of thiostrepton plus 150 mg. of neomycin.**

For additional information, write:

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LIVE CULTURE MODIFIED (Dessicated)

PROVEN PROTECTIVE POWER

- confers high level of immunity (80-90%) persisting for at least six months
- immunity not affected by low to moderate antibiotic-fortified feeds
- virtually eliminates arthritis*

*Lawson, K. F., *et al.*: Canad. J. Comp. Med.: *22*:164, 1958.

CONSISTENT IMMUNIZING SAFETY

- organisms modified to nonvirulence
- does not introduce disease
- does not produce carriers
- does not contaminate clean premises
- causes no postvaccination stunting, sickness or setbacks
- has no adverse effect on growth

IMMUNE SERUM NOT REQUIRED

- no administration of immune serum required, in fact, should not be used

Available: 5, 10 and 50 dose vials with diluent.

Manufactured by Connaught Laboratories, University of Toronto, Toronto 4, Canada.

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United States Distributor:

ARMOUR PHARMACEUTICAL COMPANY

VETERINARY DEPARTMENT • KANKAKEE, ILLINOIS

News from Merck...

SULFABROM SOLUTION 6.25%... joins SULFABROM BOLUSES to supply your total sulfa needs on an exclusive basis

WARNING: Milk taken from dairy animals within 4 days after the latest treatment must not be used for human consumption.

NEW SULFABROM SOLUTION 6.25% AND SULFABROM BOLUSES ARE THE ONLY SULFAS AVAILABLE EXCLUSIVELY TO VETERINARIANS

PROLONGED ACTION: Ordinary sulfonamides, including sulfathiazole and sulfamethazine, peak during the first 24 hours after treatment, but then soon fall below the necessary or effective 5 mg./100 cc. level. Not so with SULFABROM SOLUTION or SULFABROM BOLUSES. They can establish and maintain therapeutic blood and plasma levels *for as long as 48 hours* in cattle.

DOSAGE AND ECONOMY: Recommended treatment levels with new SULFABROM SOLUTION are 25-50 cc. per 100 lb. of body weight when injected intravenously and 50 cc. per 100 lb. of body weight when injected intraperitoneally. Cost of treatment per animal is remarkably low —only about 50¢ to $1.

RESULTS: The following remarks are abstracted from actual clinical investigation reports on the use of SULFABROM SOLUTION on file at the Merck Animal Science Research Department. (1) *"Symptoms:* Recently shipped-in cow. Temperature 106°. Labored breathing. Rales audible over chest area. *Diagnosis:* Pneumonia (shipping fever complex). *Treatment:* 700 cc. SULFABROM SOLUTION in one dose daily for two days. Sixty grams of SULFABROM BOLUSES given at time of I. V. injection. *Results:* Temperature returned to normal in 24 hours". (2) *"Symptoms:* Dystocia with removal by forced extraction of putrefied fetus. Temperature 104°. Rapid pulse and breathing. Anorexia. *Diagnosis:* Metritis. *Treatment:* Two doses SULFABROM SOLUTION 700 cc. each. *Results:* Temperature 101.6° in 24 hours. Appetite returning". (3) *"Symptoms:* Foul hoof—limited to 'between the toes' variety with swelling. *Diagnosis:* Foot rot. *Treatment:* 700 cc. SULFABROM SOLUTION. *Results:* Eight of 11 animals walked normally in 48 hours with swelling reduced to normal or near normal. Three animals required second treatment and returned to normal in 48 hours".

These quoted reports are typical of those being received from clinical investigators and veterinarians. We believe they demonstrate that *the only sulfas available to you exclusively*—new SULFABROM SOLUTION and SULFABROM BOLUSES—are also the most effective you can use.

Merck Chemical Division, Merck & Co., Inc., Rahway, N.J.

SOLUTION 6.25% ®

SULFABROM

(Sodium Sulfabromomethazine) BOLUSES

VETERINARY

MERCK

news from Washington . . .

FROM THE AVMA WASHINGTON OFFICE
J. A. McCallam, VMD
Brig. Gen. USA (Ret.)

MORE BILLS INTRODUCED IN 87TH CONGRESS:

Imported Food — *H.R. 927*, Rep. Byrnes (R., Wis.)—To authorize Secretary of Agriculture to prescribe standards and requirements governing imported agricultural food products for any product of plant or animal life intended for human or animal consumption.

Poultry Industry — *H.R. 955*, Rep. Glenn (R., N.J.)—To provide for stabilization and orderly marketing in the poultry industry.

Meat Grading — *H.R. 1035*, Rep. Multer (D., N.Y.)—To provide for compulsory grading of meat and informing the ultimate user of such grade. Would apply to meat of cattle, sheep, swine, poultry, and goats.

Research Commission — *H.R. 889*, Rep. Abernethy (D., Miss.) and *H.R. 2920*, Rep. Quie (R., Minn.)—Identical bills to create an Agricultural Research and Development Commission, consisting of 7 members appointed by the President, to provide for more effective research programs designed to expand markets for agricultural and forestry products, etc.

Import Duties — *S. 613*, Sen. Curtis (R., Neb.), *H.R. 3452*, Rep. Martin (R., Neb.)—Identical bills to impose additional duties on excess imports of certain live animals, meats, and meat products.

Border Fence — *H.R. 1980*, Rep. Utt (R., Calif.)—To provide for construction, operation, and maintenance of a land boundary fence project between monument 240 (due south Campo, San Diego County, Calif.) and Pacific Ocean, to control movement of animals, including stray and wild, across international border.

Disease Protection — *H.R. 3693*, Rep. Wright (D., Tex.)—To provide for greater protection against introduction and dissemination of disease of livestock and poultry.

Experimental Animals — *H.R. 3556*, Rep. Moulder (D., Mo.)—To provide for humane treatment of animals used in experiments and tests by recipients of grants from the federal government. Is companion bill to Congresswoman Griffiths' measure (see JOURNAL Feb. 15, 1961, adv. p. 10). Sen. Cooper (R., Ky.) announced plans, Feb. 2, 1961, to reintroduce legislation in a few days relative to the humane treatment of animals used in research.

(Continued on adv. page 18)

"I can't see us going to the dogs...

"I'm a general veterinarian myself, and my brother, Art, has a small-animal practice in a city 50 miles away. Once in a while, we get to discuss the problems of both aspects of the profession.

"Problem number one for general vets. We've got more veterinarians around the country than we think we have—amateur veterinarians. They are our friends and neighbors, the farmers we should be working with to build a healthy livestock industry. Many of them are trying to go it alone, based on the fact that they can buy their own supplies—the same supplies we use, but with different labels and names.

"How about small-animal practice? Well, Art says the handwriting's on the wall of his clinic. It won't be too long before pet owners get their hands on almost everything they think they need, the same as farmers.

"I'm holding the fort. I make sure my supplies come from supply houses that sell to veterinarians exclusively. I think they have a better appreciation of our profession."

Construction Grants

Among bills in House to provide grants for construction of medical, dental, and public health educational facilities, and other purposes are *H.R. 2414*, Rep. Dingell (D., Mich.); *2747*, Rep. Addonizio (D., N.J.); and *3276*, Rep. Fogarty (D., R.I.). Latter bill, cited as the "Professional Health Training Act," would provide operational grants to schools of medicine, osteopathy, and dentistry. The bill, *H.R. 3276*, authorizes (1) $100,000 annually to each such degree-awarding school, or a school providing only 1, 2, or 3 years of such training, $25,000, $50,000, or $75,000, respectively; (2) additional $500 for each student enrolled; (3) extra $500 for each student enrolled in excess of average past enrollment. Rep. Fogarty also introduced *H.R. 3438*, to amend P.H.S. Act to provide federal assistance to states which award scholarships to medical and dental students. Would authorize $5,000,000 for fiscal year beginning July 1, 1961, and $10,000,000 for fiscal year starting July 1, 1962, and each 8 succeeding years.

Voluntary Pension

Additional bills in House to encourage establishment voluntary pension plans by the self-employed are *H.R. 249, 736, 2289, 2391, 2406, 2723, 2801, 3553*, respectively by Reps. Libonati (D., Ill.); McDonough, (R., Calif.); Schwengel (R., Iowa); Anfuso (D., N.Y.); Broomfield (R., Mich.); G. P. Miller (D., Calif.); and Mrs. May (R., Wash.). All similar or identical with Geogh measure, *H.R. 10*.

IN BOVINE MASTITIS

CONSISTENT THERAPEUTIC PERFORMANCE

FURACIN® VETERINARY

BRAND OF NITROFURAZONE

A unique, broad-spectrum antibacterial, FURACIN displays decisive effectiveness against mastitis-inducing organisms often resistant to other therapeutic agents. These include such causative pathogens as Staph. aureus, Str. agalactiae, Str. dysgalactiae, Str. uberis, E. coli and Ps. aeruginosa, sensitive to FURACIN.[1,2]

Given early in acute cases, FURACIN acts to prevent severe, irreversible udder damage of chronic mastitis that usually results in fibrosis and permanent loss of the cow's milk-producing potential. Thus, by reversing clinical signs of acute infection and arresting the process of induration, FURACIN helps maintain the integrity of the duct system and re-establish normal milk production levels.

A large animal practitioner who has made FURACIN his primary antimastitis agent, summarizes its principal advantages:

- it is a professional product
- there appears to be no development of bacterial resistance
- it is milk-miscible, thus, seems to be totally distributed throughout the injected quarter
- it does not interfere with healing
- is compatible with other agents[3]

FURACIN SOLUTION VETERINARY SQUEEJET®

Improved intramammary dosage form of FURACIN in a convenient, low-cost single-dose, ready-to-use dispenser.

Contains FURACIN, 0.2%, in a water-miscible base.
Available in SQUEEJETS of 30 cc., boxes of 12.

Note: Milk from cows treated with FURACIN Solution Veterinary should be discarded or used for purposes other than human consumption for at least 24 hours after the last treatment.

FURACIN-PENICILLIN GEL VETERINARY

The broad-spectrum activity of FURACIN is combined with the specific antistreptococcal action of penicillin for additive antibacterial effect.

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References: 1. Kakavas, J. C.; Roberts, H. D. B.; deCourcy, S. J., and Ewing, D. L.: J. Am. Vet. M. Ass. 119:203 (Sept.) 1951. 2. Kakavas, J. C.: Antibiotics Annual 1954-1955, New York, Medical Encyclopedia, Inc., 1955, p. 323. 3. Jackson, R. A.: A Program for Mastitis Control. Read at the Second Regional Conference on the Nitrofurans in Veterinary Medicine, Madison, Wisconsin, May 28, 1959, pp. 23-26.

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Isolation of a Virus from Clinical

Shipping Fever in Cattle

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THE AGENT or agents causing shipping fever have been under investigation for some time.[3] Currently, the condition is considered to be a disease complex. Previous transmission studies and observations suggested that a viral agent was involved.[8] This possibility has been advanced by others.[4,11,12,14,16-19] The purpose here is to report on the isolation of a viral agent from cattle affected with shipping fever.

Materials and Methods

Source of Material.—From western ranges, 330 Hereford feeder calves were shipped to the Ohio Agricultural Experiment Station. The calves weighed 400 to 500 lb., and shipment by rail took approximately 5 days. Body temperatures were taken of approximately 40 calves and observations were made daily. From calves with signs of shipping fever, nasal washings were collected into Hanks' balanced salt solution (HBSS). Nasal mucus was collected by inserting a sterile cotton swab applicator into each nostril. Samples were then taken to the laboratory for inoculation or storage at −65 C.

Serum Collection and Storage.—Blood samples were collected; red and white blood cell counts were made; defibrinated blood was used for transmission studies and for serum for serologic examination.

Tissue Culture.—Primary bovine kidney monolayer cultures were prepared in tubes and bottles.[13] The cells were grown in a nutrient medium of HBSS with 0.5% lactalbumin hydrolysate and 10.0% calf serum. The medium was replaced with HBSS containing 0.5% lactalbumin hydrolysate and 3.0% porcine serum or no serum. Prior to inoculation and changing mediums, the cells were washed 3 times with HBSS. The following antibiotics were added to each milliliter of medium used: 200 units of penicillin, 100 μg. of streptomycin, and 50 units of nystatin.

Virus Isolation Procedures.—Nasal washings were thoroughly agitated and 0.2 ml. inoculated into each tissue culture bottle (4-oz. prescription bottle). When cytopathic changes were visible or suspected, 0.2 ml. of medium was transferred into another bottle for 2 or 3 additional passages.

Bacterial Examination.—Nasal swabs and washings were streaked on blood agar plates made with 5% defibrinated bovine blood and incubated aerobically for 24 to 48 hours at 37 C. Attempts to isolate pleuropneumonia-like organisms (PPLO) were made by inoculation of phenol red medium, Morton's medium,[15] and PPLO agar plates enriched with PPLO serum fraction.*

Hemagglutination and Hemagglutination-Inhibition Tests.—Hemagglutination (HA) and hemagglutination-inhibition (HI) tests were modified to incorpo-

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These studies contribute to the regional research project, Shipping Fever of Cattle (NC-44).

*Difco Laboratories, Detroit, Mich.

rate the use of bovine red blood cells at the 0.4% suspension level in the HA test and the treatment of serums for absorption of nonspecific inhibitors. The absorption procedure was carried out by adding quantities of a mixture of 25.0 Gm. of kaolin in 100 ml. of physiologic saline solution with the serums, and allowing it to stand for 20 minutes at room temperature.[6] The serums were then centrifuged at 1,500 r.p.m. for 10 minutes and the supernatant serum decanted. Next, 0.2 ml. of a 50% suspension of bovine erythrocytes was added to each serum sample and held at 4 C. for an hour, with frequent shaking to absorb any isoagglutinins of bovine erythrocytes.[6] The bovine erythrocytes were removed by centrifugation. Serial twofold dilutions of the serums were made and an equal volume of antigen diluted to contain 4 hemagglutinating units of virus was added. The antigen used for HA and HI tests was tissue culture fluid from bovine kidney tissues in which a cytopathic response had appeared. In addition, the SF 4 antigen was used in comparison.

Hemadsorption.—A hemadsorption technique was used with an 0.25% suspension of guinea pig and bovine erythrocytes.[20]

Neutralization Tests and Titrations in Tissue Culture.—Neutralization tests were made with serial twofold dilutions of serum and an equal amount of virus suspension. These were incubated at 37 C. for 60 minutes, and tissue culture tubes were inoculated with 0.2 ml. of the suspension. Observations were made for 7 days. The reciprocal of the highest dilution of serum in which neutralization occurred was considered as the neutralization titer. Infectious bovine rhinotracheitis serum,* SF 4 serum,** and homologous serum were used in neutralization studies.

Calf Exposures.—Dairy calves, 3 to 5 months old, were obtained from the Station herd and held in isolation until used for exposure. Blood samples were collected from all calves prior to exposure, and only those with a negative titer or less than 1:8 were used. Nasal washings were collected for tissue culture examination prior to inoculation. The calves were exposed to an aerosol of 5.0 ml. of tissue culture harvest in which cytopathic changes were present.

Observations and Results

Observations of Shipped Calves.—Of the 165 calves observed closely upon arrival at the Station, 1 was sick the second day after arrival (5 days enroute for a total of 7 days) and required treatment. Other calves in the group developed clinical signs of shipping fever through postarrival day 18, after which no further clinical signs of shipping fever were found. Daily body temperatures taken within this group of calves were high in many, although clinical signs of illness were not apparent. From 12 calves with marked clinical signs of shipping fever, 2 microorganisms were recovered in tissue culture.

The first calf from which the recovery was made was sick the second day after arrival in the feedlot and had a temperature of 107.0 F.; other clinical signs were a mucoid nasal discharge, pulse rate of 120 per minute, respiration rate of 84 per minute, anorexia, and slight depression. It was necessary to treat this calf for more than a week before it completely recovered. The other calf had a temperature of 107.6 F., anorexia, and nasal discharge; it recovered without treatment.

Virus Isolation.—An agent cytopathogenic for bovine kidney cells was isolated from 2 of 12 calves screened in this system. The samples were collected and screened 30 days later. The agent was found to cause hemagglutination. There were no serum samples available from these calves before they had signs of disease. Samples taken from these 2 calves and 2 others had the following HI titers, 1:16, 1:32, and 1:128 (2 calves). These samples were taken at the time of obtaining specimens. The first 2 were taken on postarrival days 4 and 5 and the last 2 on days 7 and 9. Bacteriologic examination of nasal washing yielded *Pasteurella multocida*, *Pasteurella hemolytica*, and staphylococcic organisms.

Tissue Culture.—The primary isolation of the agents resulted in cytopathic effect (CPE) in 36 to 72 hours. This effect was first observed in scattered cells as cytopathic retraction and rounding of cells with areas of cellular aggregation, increased granularity, and in other areas, fragmentation, and detachment of cells leaving long isolated strands attached to the glass. Finally, there was death and detachment of cells (Fig. 1 and 2). The entire cytopathic phenomenon was completed in 92 to 120 hours. Infectivity titers were found to be in the range of 10^{-6} to 10^{-7}.

The addition of bovine serums to the tissue culture resulted in delay of CPE or in the failure of CPE to develop in several instances (negative to HI tests). Infected tissue culture fluid produced hemagglutination of guinea pig and bovine erythrocytes. Hemadsorption was demonstrated with

*Supplied by Dr. T. L. Chow, Colorado State University, Fort Collins.

**Supplied by Dr. R. C. Reisinger, Agricultural Research Service, Beltsville, Md.

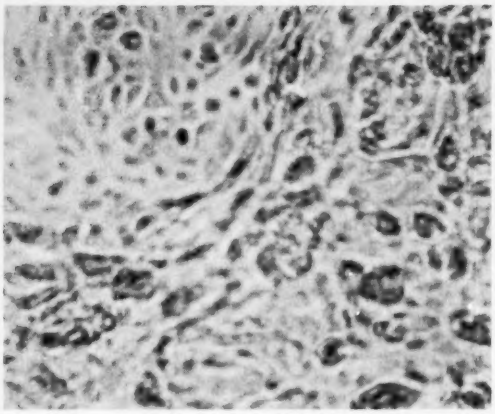
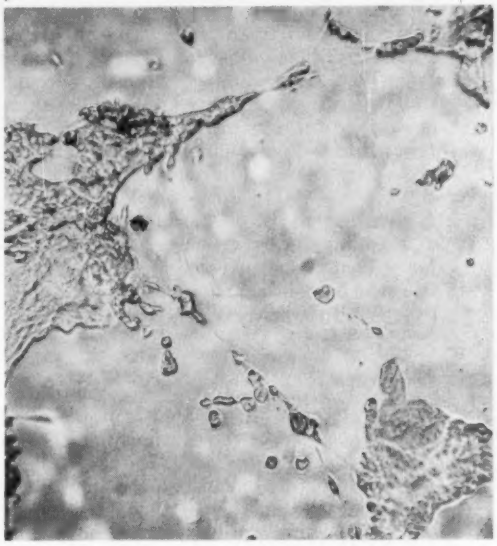


Fig. 1—Uninfected bovine kidney tissue culture. Unstained; x 40.

Fig. 2—Bovine kidney tissue culture 72 hours after inoculation with agent recovered from nasal washing of steer with respiratory disease. Unstained; x 35.



guinea pig and bovine erythrocytes in tissue culture.

Bacteriologic Examination.—Pasteurella multocida was isolated from 8 of the 12 calves with clinical signs of shipping fever, and *Past. hemolytica* was isolated in 4 instances. We failed to isolate PPLO from any of these calves, although previous isolations have been made from such groups.[9] Staphylococci and diplococci were also found in most calves examined. Streptococci were isolated from 4 of the 12 calves examined.

Neutralization Tests. — Neutralization studies have not been completed; however, preliminary results indicate that the agent is not neutralized by infectious bovine rhinotracheitis (IBR) convalescent serum. Convalescent serum from experimentally exposed calves neutralized approximately 5,000 $TCID_{50}$ at a dilution of 1:20. The SF 4 antiserum was similar in its neutralization properties.

Experimental Exposure.—Calves exposed to an aerosol mist of infected tissue culture fluids frequently developed a diphasic temperature reaction. Generally, it appeared on postexposure days 3 and 4 and again on days 7 and 8. In some calves, a slight temperature elevation occurred 24 hours after exposure and, in a few, the secondary temperature peak occurred on postexposure day 10. Preliminary white blood cell counts indicated that a moderate transitory leukopenia occurred which was followed by a leukocytosis.

The clinical signs of the disease were mild in many instances and could be easily overlooked. Signs of illness observed on close observations in some animals were slight serous nasal discharge, increased respiration, coughing, lacrimation, and moderate depression. The virus was reisolated from 1 calf 8 days after exposure to the virus. An increase in the serum titer from 0 to 1:512 was common in most calves experimentally exposed to the virus.

Discussion

The isolation of viral agents from cattle with shipping fever strengthens earlier hypotheses that a virus may play a part in development of the shipping fever syndrome; however, it is difficult to attach definite significance to the presence of these viral agents at this time. The occurrence of subclinical cases of shipping fever indicates that the course and severity of the disease varies.[10] What factors or other agents may be necessary to cause an increase in number of cases or severity of the disease requires further investigation. The occurrence of a moderate leukopenia suggests that resistance of the hosts to secondary bacterial invaders may be lowered. The failure of organisms such as Pasteurella to reproduce the shipping fever syndrome following experimental exposure would indicate they alone are not primary agents.[7]

The isolation of psittacosis-lymphogranuloma viruses by other workers,[12,14,16,17] in-

dicates that more than one group of viruses may be involved in the shipping fever complex.

The biological and antigenic properties of the bovine strain of parainfluenza 3 virus are similar to those properties possessed by parainfluenza 3 virus isolated from man. This similarity excites speculation regarding the host relationships of these agents.[1,2,4] An interesting observation made regarding the parainfluenza virus is that it occurs in young children and that clinical signs are mild in spite of pulmonary involvement and fever.[5] The clinical syndrome of shipping fever in some respects is similar.[10] That the virus causing shipping fever in cattle is identical with that causing parainfluenza in man has been suggested.[4]

Summary

A viral agent was isolated from the nasal washings of feeder calves which had clinical signs of shipping fever. The agent produced cytopathic changes in bovine kidney tissue cultures and hemagglutinated guinea pig and bovine erythrocytes. A body temperature increase and mild signs of disease occurred in calves exposed to the virus in an aerosol mist. Infectious bovine rhinotracheitis antiserum failed to neutralize the agent, whereas serum from convalescent calves and SF 4 antiserum neutralized the virus.

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FMD Virus Transmitted by Air

In 3 of 4 experiments conducted in Denmark and involving 40 cattle in isolation units, susceptible cattle contracted foot-and-mouth disease from infected cattle penned 30 feet away. Airborne virus was considered responsible for the spread of the disease.—*Nord. Vet.-med., 12, (1960): 497.*

Recent Research Findings on

Bovine Tuberculosis

and Their Application in Eradication

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IN AREA TESTING with tuberculin, the percentage of reactors dropped from 5.0 per cent in 1917 to 0.11 per cent in 1954. From 1954 to 1959, however, the percentage of reactors rose to 0.23 per cent. Of these reactors, 70 per cent were in 9 North Central States where most of the area testing was carried out. What is causing this increase in the number of cattle in this country that react to tuberculin?

Improved Detection Techniques

When we consider the proved efficacy of tuberculin for testing cattle, it is reasonable to assume that most of this increase is caused by an increase in *Mycobacterium tuberculosis* var. *bovis* infection.

But this increase may also be partly attributed to improved techniques for detecting infections with the bovine tubercle bacillus. Some improved techniques as recommended[3] are uniformity in the following: tuberculin dose, needle size, injection site, criteria for interpretation of reaction, retest procedure, and use of slaughter findings for tracing cows with lesions to herds of origin and continuous testing of such herds.

In connection with the importance of a uniform tuberculin dose, our investigation indicates that the reaction from injection decreases as the number of simultaneous injections increases.[11] In laboratory animals, the decrease in sensitivity that results from multiple injections is a systemic effect and not a local one.[20] It is advisable to have a uniform injection site because of variable sensitivity for different body areas. Recent research indicates that the most sensitive area is from the angle of the mandible to a point near the manubrium of the sternum.[10] Uniform measurement of the reaction may improve the test accuracy. The swelling that resulted from injecting 0.1 to 0.2 cc. of heat-concentrated, synthetic-medium tuberculin was 3 mm. or greater in 92.4 per cent of 2,543 tuberculous cattle and less than 3 mm. in 97.1 per cent of 2,480 nontuberculous cattle.[23]

The same care used in the first tuberculin test of animals should be used in retests. Local desensitization, which is directly proportionate to the degree of sensitivity, occurs at the injection site. To avoid the effects of this desensitization, retests should not be closer than 4 inches from the previous injection site.[8] The time element is also important in distinguishing between bovine tuberculosis and nonspecific infection.[7] Generally, any sensitization loss from the first test will be regained within 30 days if the animals are tuberculous, but it will not be regained in nontuberculous animals. Therefore, retests might reduce the number of animals having no visible lesions in herds that are suspected of being sensitized to nontuberculous organisms. Experimental retests should be carefully checked in several areas of the country before the method is finally adopted.

Evaluation of Detection Techniques

The results of applying the improved techniques have been evaluated by an un-

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satisfactory method, that is, gross postmortem findings. Because of the unquestioned acceptance of these findings, the reliability of the tuberculin test has been questioned. At slaughter, 75 per cent of the reacting cattle have no visible lesions, and we tend to regard most of them as nontuberculous. However, early tuberculous lesions are difficult to detect, even on microscopic examination. Also, it is impossible to examine all parts of an animal at postmortem inspection. Therefore, the fact that no visible lesions are present is not proof that *Myco. tuberculosis* var. *bovis* is absent.

We recognize, of course, that every tuberculous infection—either in man or in lower animals—will not necessarily react positively to tuberculin. Conversely, positive reactions are sometimes observed in apparently healthy cattle. Because of the inadequacies of bacteriologic, microscopic, and macroscopic methods for detecting tuberculosis, we tend to infer that tuberculin tests are inefficient.

To improve the application and interpretation of the tuberculin test, we must improve postmortem inspection procedures.[16] Then, if no lesions are found, we must try to isolate and identify the sensitizing organism.

Sensitization Due to Other Mycobacteria

Another possible reason for the increase in number of reactors may be that the cattle have been sensitized by organisms other than *Myco. tuberculosis* var. *bovis*. Among these are Johne's bacillus, avian tubercle bacillus, human tubercle bacillus, and atypical acid-fast mycobacteria.

One of the most important recent observations in the tuberculosis field is that atypical acid-fast mycobacteria can be associated more or less closely with disease processes in human beings.[22] These mycobacteria differ from the true human tubercle bacillus mainly in cultural processes and pathologic characteristics.

In some areas of the United States, hospitals reported that atypical mycobacteria were involved in 1 to 2 per cent of all tuberculosis cases.[14,27] However, a review of 929 consecutive culture-positive persons at the Cook County Hospital in Illinois from February, 1955, to November, 1957, showed that 300 (32%) of the patients had atypical mycobacteria at one time or another.[13] The usual figure of 1 to 2 per cent may not be impressive, but it is worthwhile to consider these atypical mycobacteria because of their possible relationship to the cause of bovine tuberculin reactors with no visible lesions.

Atypical acid-fast mycobacteria have been found[2] in lymph nodes of cattle. Rapid-growing acid-fast mycobacteria have been isolated from cattle with bovine mastitis[12] and perhaps were introduced into the teat canal by contaminated apparatus used in mastitis treatment. Many of the isolated strains were identified as *Myco. smegmatis;* however, *Myco. fortuitum* and *Myco. phlei* were also found in some animals. The use of some techniques developed in studying atypical acid-fast bacilli in tuberculosis of man may help identify microorganisms that could sensitize cattle to tuberculin but not produce disease.

Atypical acid-fast bacilli, called "anonymous mycobacteria" by one investigator, may be divided into 4 groups as follows:[22]

Group 1. — This group comprises photochromogens that grow slightly faster than tubercle bacilli at 37 C.; unlike the tubercle bacilli, they also grow slowly at room temperatures of 20 to 25 C. Small inoculums may require more than a month's incubation at room temperature. Cultivation on simple mediums is possible and advantageous in characterizing them. The photochromogens resemble the saprophytic mycobacteria in possessing high catalase activity.

In serologic, allergic, immunologic, and pathogenic tests, the photochromogens were partially, but not completely, identical with tubercle bacilli. In agar precipitation tests, most strains resembled the human tubercle bacillus.[18] None resembled the particular strains of the bovine tubercle bacillus that were examined. Most types of photochromogens sensitized laboratory animals to a tuberculin made from *Myco. tuberculosis* var. *hominis*.

Photochromogens are likely to be involved with the disease process in human beings. Often the same strain has been isolated repeatedly from a patient who later underwent surgery and provided resected lung tissues from which the same strain was isolated. In guinea pigs, a 5-mg. dose per animal given subcutaneously did not produce progressive disease, but a 1-mg. dose per animal given intracardially often produced death in 4 to 5 weeks. In mice, a 0.01-mg. dose injected intravenously or 3 mg. injected intraperitoneally usually produced lesions in the lungs, liver, spleen, and kidneys and occasionally caused death.

Group 2.—In this group are scotochromogens that grow slightly slower than true tubercle bacilli at 37 C.; they grow slowly at 20 to 25 C. and also grow on simple mediums. They possess vigorous

catalase activity. Some strains produce antigens, which are precipitated by antiserums (from sensitized rabbits), to the human tubercle bacillus in the agar precipitation test; thus, like most of the photochromogens, they resemble the human tubercle bacillus. Other strains produce antigens which are precipitated by antiserums to the bovine tubercle bacillus; thus, they resemble the bovine tubercle bacillus. Pathogenicity is low for both guinea pigs and mice because lesions are produced only rarely. These organisms are seldom isolated more than once from a patient's sputum and then only in cases of true tuberculosis. They are usually not isolated from lung tissue.[22]

Group 3.—This classification includes nonphotochromogens or Battey* bacilli that appear so much like true avian tubercle bacilli that the 2 types need to be identified by cultivation at room temperature at which only nonphotochromogens will grow. Certain strains of this group are related to the human tubercle bacillus. At least one strain is related to the strains of the bovine tubercle bacillus that have been studied. Some strains can sensitize laboratory animals to a strong reaction against human tuberculin, and a single oral dose of Battey bacilli has sensitized guinea pigs.[5] These bacilli have been linked quite definitely with disease in human beings where repeated isolations of the same strain were followed by isolation from resected lung tissue. However, they have also been isolated from the saliva of normal persons.[5] They are not always pathogenic for guinea pigs, but they usually are for mice and hamsters. Strains most pathogenic for man are not necessarily the most pathogenic for laboratory animals.

Group 4.—"Rapid growers" that are typified by *Myco. fortuitum* and various species of Nocardia compose this group. They may be obtained from sputum samples, gastric washings, and material aspirated from the respiratory tract. Growth is luxuriant in 1 and 2 days, even on simple mediums. A strain of *Myco. fortuitum* has been found[15] that sensitizes rabbits to bovine and avian tuberculins but not to human tuberculin.

Recent Studies and Outlook

The foregoing description gives some idea of the properties of atypical mycobacteria and indicates that some relationship exists between certain strains of the bovine bacillus and the scotochromogens, nonphotochromogens, and rapid growers. Perhaps closer relationships could have been established if the bovine tubercle bacillus had been studied as thoroughly as the human tubercle bacillus in this connection. Pathologic specimens from bovine animals were examined only recently with the same interest accorded to specimens from man. In the next few years, we may be able to clarify the possible relationship between atypical mycobacteria and the causative agent in bovine reactors with no visible lesions.

Isolation and Identification.—Needless to say, classical solid and liquid mediums have been invaluable in isolating and characterizing atypical mycobacteria. Also, there is renewed interest in examining bovine pathologic specimens for viable bovine tubercle bacilli. Outstanding success has been reported[16] in obtaining positive results from culturing lymph glands that had, on close examination, lesions that escaped notice during meat inspection. Another worker[3] has thoroughly covered the subject of isolating tubercle bacilli from pathologic specimens. Other important studies were made by cultivating mycobacteria on chicken embryonic tissue. A higher percentage of positive diagnoses is obtainable by cultivation on chorioallantoic membranes than by using more ordinary methods.[21]

Growth characteristics of virulent human and bovine tubercle bacilli and atypical acid-fast bacilli in cell cultures of Hela cells, monkey kidney cells, and human amnionic cells after the cells had been trypsinized and suspended have been reported.[24] Results indicated the possibility of distinguishing virulent tubercle bacilli from atypical and saprophytic mycobacteria by their growth rates and patterns in cells.

In general, workers found that allergens prepared from homologous and similar strains of atypical mycobacteria isolated from man gave larger reactions in those subjects than mammalian tuberculin. Laboratory animals inoculated with atypical mycobacteria generally reacted in the same manner as human beings.

Purified protein derivatives (PPD) have been prepared[1] by precipitating the proteins from concentrated culture filtrates of photochromogens, scotochromogens, nonphotochromogens, and a strain of Nocardia. One group of rabbits and one group of guinea pigs were sensitized to each bacillus mentioned, to bacillus Calmette-Guerin (BCG), and to the human tubercle bacillus. Tube precipitin tests indicated cross-reactivity; no specificity was observed for each PPD and its homologous antiserum until high dilutions were reached. Upon agar diffusion precipitation there were common antigens in all PPD preparations. All sensitized animals cross-reacted to the skin tests

*First isolated at the Battey State Hospital, Rome, Ga.

with the different PPD preparations; however, there was distinct evidence of specificity for homologous sensitization with each PPD, especially with the one from Nocardia. It was later found in work on human populations that PPD from photochromogens and PPD from the human tubercle bacillus cross-reacted to the extent that the resultant diseases could not be differentiated except by cultural isolation and identification of the infecting organisms.[4] On the other hand, the cross-reaction between the nonphotochromogens and the tubercle bacilli was low enough that the diseases could be distinguished by their respective PPD's.

Problems of Cross-Reactivity.—The complex problem of cross-reactivity between various acid-fast microorganisms involves several factors. One has to consider the possible existence of the following antigenic components that are detectable by any given test: (1) those broadly specific for the genus Mycobacterium, (2) those specific for members of a given species, (3) those more limited in specificity to members of a variety within a species, and (4) those restricted in specificity to a given strain of a variety. The complexity is increased when one considers the possibility that the proportion of these components may vary from one individual strain of acid-fast microorganism to another; also, the ability of one animal to respond to the stimulus of a given component may differ from that of another animal and, furthermore, various components may produce a different degree of response within the same individual. All of these possibilities were encountered in experimental work on cattle[9] and on guinea pigs,[6,17] as well as in epidemiologic work on populations of man.[4] The possibility of correctly identifying a single sensitizing organism is usually good if the specific antigen is available for testing. Where mixed sensitizations co-exist, the use of several different antigens aids in identification. However, it is still often difficult to diagnose the type of infection in any individual animal by using only test results. The sensitizing organism must be isolated and identified.

In a tuberculous patient, it has been shown that there was no correlation between his serum antibody reaction in a modified Oudin agar diffusion test and his sensitivity to the intradermal tuberculin test.[19]

Future Considerations.—Current research on serologic tests for infection with the bovine-type tubercle bacillus indicates that the complement-fixation test is more specific than other blood tests such as the hemagglutination test or its hemolytic modification.[25,26] If present expectations are fulfilled, serums from tuberculin reactors would give positive reactions with serums from animals infected with either Johne's disease or tuberculosis. The complement-fixation test does not differentiate between these infections. The infections could be distinguished by testing with a more specific Johne's antigen, which is being developed.

For field application, a blood test of sufficient sensitivity to detect a percentage of infected animals could do for tuberculosis what the ring test has done for brucellosis. Blood samples obtained for routine brucellosis testing could be checked by the test to detect tuberculosis-infected herds. This test could then be followed by an intradermal tuberculin test.

Conclusion

Research will improve our knowledge of tuberculosis. However, we should not expect too much from techniques not yet developed. We must first ascertain that we are using all available methods and experience to the best possible advantage. For example, the intradermal injection of tuberculin must be performed carefully and accurately. In using the tuberculin test, we are dealing with a degree of allergy in the animal that demands extremely critical and meticulous techniques to detect. Unless the injection is carefully applied and the reaction interpreted with extreme care and professional judgment, the test has little value. Future research will not compensate for careless application and interpretation of the present tuberculin test.

The tuberculin presently in use is the best available. It is standardized so that the recommended dose will produce a reaction in most infected animals. Occasionally, infected animals may fail to react because their sensitivity to tuberculin is so low that the standard dose will not detect a reaction.

In research on tuberculosis, we must remember that, in addition to *Mycobacterium tuberculosis* var. *bovis*, there are other bacteria belonging to the genus Mycobac-

terium, which may sensitize animals to tuberculin and produce disease in man and animals.

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Reactions to Local Anesthetics

Untoward reactions to local anesthetics may be due to absorption of the anesthetic into the circulatory system, and production of systemic effects, rather than to local tissue destruction or to true allergic phenomena. Often reactions are ascribed erroneously to sensitivity or idiosyncrasy.—*New England J. Med., 263, (Nov. 10, 1960): 964.*

Brucella Whey Reactions in Problem Herds

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MARGARET E. MEYER, B.S.

THE BRUCELLOSIS eradication program in many parts of the country has reached such an advanced stage that certain problems inherent in dealing with the vestiges of a once widespread infection are coming more and more into prominence. These problems are concerned with (1) the failure of the serum-agglutination test to detect infected animals accurately, (2) the interpretation of "suspicious" reactions, and (3) the frequent lack of correlation between the individual serum-agglutination test and the Brucella ring test (BRT) on the herd. The typical finding in the latter situation is a suspicious BRT on the herd without a single serum reactor in the milking string. This situation was encountered frequently in the course of an eradication program in Sonoma County, California. Since the whey agglutination test had been found useful in the detection of mammary shedders of Brucella organisms[4] and had in fact been used successfully in eradication programs,[3] it seemed desirable to test this procedure for its ability to supplement the blood test in solving some of the problems of the kind referred to.

Materials and Methods

The eradication program in Sonoma County had been designed to proceed in the following manner: Herds were whey-tested and reactors to the whey test were blood-tested. Cows reacting positively to the blood test were removed from the herd. This process was repeated in 30 days, and if after a further 30 days the herd remained BRT-suspicious, it was put on a complete blood-testing schedule until free of reactors. It then reverted to the BRT, which remained the sole testing mechanism so long as its results were negative. The moment it became suspicious, the herd returned to the blood-testing routine. It was during these alternations between blood test and BRT that it became obvious that the 2 tests did not necessarily confirm each other.

Milk samples were obtained only from herds that had been given 2 whey tests, had been rid of their blood reactors, and had remained suspicious on the BRT. At the time of the next blood test, which was the next step in the eradication program, milk was collected under sterile conditions from all lactating cattle that had not calved within a week prior to the test, and whose udder secretions appeared normal. Sufficient quantities were drawn for whey agglutination tests and guinea pig inoculation tests.

The samples were forwarded to our laboratory within 24 hours of collection and refrigerated if a delay of more than 6 hours intervened between collection and delivery.

At our laboratory, all samples were whey-tested in the manner previously described,[2] and the results compared with those of the blood test which were furnished to us by the regional laboratory. All whey samples agglutinating in amounts of 0.02 ml. or less were considered positive.

The milk of any cows which had a discrepancy between the whey and blood serum reaction was processed for administering to 2 or 3 guinea pigs in the following manner: A composite milk sample from all 4 quarters, amounting to 200 to 250 ml., was used. Of this amount, 40 ml. was centrifuged at 5,000 r.p.m. in a Servall SS 1 angle centrifuge for 10 minutes. The layer of milk between the cream and the sediment was removed and a further 40 ml. added. The process was repeated until the entire sample had been concentrated in this manner. Three, or in some cases 2, guinea pigs were given 5 ml. of the concentrate intraperitoneally. After 6 weeks to 2 months, blood samples were collected from the guinea pigs; they were killed and necropsies were performed. The blood serum was tested for Brucella antibodies by the plate-agglutination test and the spleen was cultured for *Brucella abortus* on tryptose agar with dextrose. Cultures were kept for 14 days unless Brucella organisms were detected earlier. All presumptive isolates were tested in Brucella antiserum before being identified as Brucella.

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Among the numerous persons in the state and federal service, as well as the University of California, who gave us invaluable help and cooperation, we should like to single out Mr. John R. Watson, who in his capacity as member of the State Board of Agriculture, regent of the University of California, and dairy rancher in Sonoma County, did much to make this study possible.

Results

A total of 3,425 cows in 22 herds were whey tested. Of these, 181 had discrepancies between the blood serum and the whey test. The categories of discrepancies recognized were: blood negative-whey positive, blood suspicious-whey positive, blood suspicious-whey negative, and blood positive-whey negative. The number of mammary shedders in the various categories are shown (Table 1). It is apparent that in the blood-suspicious groups the whey test is remarkably accurate in clarifying at least the shedder state, if not the state of infection, of a cow.

TABLE 1—Discrepancies Between Whey and Blood Tests in Relation to the Shedder State

Blood	Whey	Number	Shedders
−	+	23	5
s	+	12	9
s	−	140	2
+	−	6	1

In the other 2 categories, the 2 tests err with a frequency which, in view of the small numbers involved, is not sufficiently different to give one or the other a place of preference. In all, however, the blood test, as it is used in the eradication program, failed to detect 16 out of 17 infected and shedding cows, while the whey test failed in 3 cases. If one were to assume that the 5 nonshedding blood reactors carried infection in organs other than the mammary glands, the failures of the whey test would rise to 8 out of 22, while those of the blood test would be 16 out of 22. There is, of course, no evidence other than the Brucella titer that the 5 nonshedding blood-reactor cows were in fact carriers of infection.

Discussion

It is a truism that the last residue of infection in a population behaves more erratically in regard to ordinary diagnostic reactions than does a group where no check has ever been applied to the infection previously. It is in fact partly this erratic behavior that makes for residual infection. This has been the experience in all situations where an infectious disease has been brought under control, as in the cases of bovine tuberculosis and human syphilis, and the problem of false tests had assumed proportions it never had when the infections were widespread. In both situations, workers have long been reconciled to the biological fact that no single diagnostic test is 100% accurate and have cast about for new approaches. Brucellosis control has likewise come to the point where the low level of infection has increased the incidence of serologically aberrant reactions, and the blood test as the sole basis for elimination of infected animals is rapidly losing its usefulness.

The development of serologic milk tests has been well publicized through the ring test[6] and, more recently, through the exploratory work on the whey test. In a series of publications,[2,4,5] it was shown that the whey test correlated closely with the blood test and with infection of the mammary gland, and that it could be used in eradication programs in lieu of, or in association with, the blood test. Similarly, favorable experiences with the whey and milk test are reported from several European countries.[1,8,11] In some studies in the Midwest, other investigators showed the whey test in a much less favorable light, but 2[7,9] of 3 such studies were concerned with infected blood reactor cattle exclusively, so that the disagreement between the 2 tests was bound to show up only the drawbacks of the whey test. In the third study,[10] which considered both reactor and nonreactor cattle, the whey test was shown to be at considerable variance with the results of the blood tests and cultural examinations. No entirely adequate explanations accounted for these discrepancies in different parts of the country. The present study merely shows once more that they do exist. The proportion of infected cattle in the 4 categories is reasonably consistent with that found previously in California in unselected cattle populations.[2,3]

Our results permit several conclusions. For one thing, neither test will identify all infected cattle, and any program relying on one type of test to bring eradication to completion is setting for itself an impossible task. The 2 tests, blood serum and whey, however, will, as a rule, not miss the same infected cattle. We know of only 2 cases where cattle negative to both tests proved to be infected.[5] The 2 procedures, therefore, can complement each other. The Sonoma eradication program failed to take advantage of this fact. By screening the herds through whey testing and then removing only those also positive to the blood test, it

missed not only the blood-positive cattle that did not react to the whey test but also ignored the whey-positive cows that gave a negative or suspicious blood reaction. This situation is diagrammed (Fig. 1). The cattle eliminated are represented by the cross-

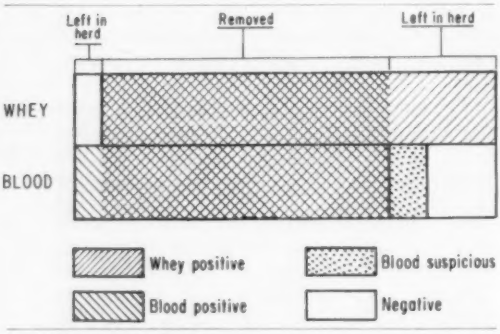

Fig. 1—Disposal of reactors to the whey and blood tests in the Sonoma County (Calif.) brucellosis eradication program.

hatched portion of the diagram. The left extension of this portion symbolizes the blood reactors that were negative to the whey test, while the right represents those whey reactors that were blood-suspicious or -negative. Our figures indicate what proportion of individuals in each category will be Brucella shedders, and how many shedders are thus left in the herds. In the cattle that are negative to one test and positive to the other, between 15 and 25% can be expected to excrete Brucella in the mink. A much larger proportion (in our group 75%) carry udder infections among cattle that are blood-suspicious and whey-positive. In the blood-suspicious—whey-negative group, the incidence of shedders is negligible.

These results point clearly toward the usefulness of the whey test in detecting infected cattle, particularly if it is used in conjunction with the blood test. In the blood-suspicious group, it appears to make a clear distinction between shedding and nonshedding cattle and is, therefore, well suited for use in herds which are BRT-suspicious but fail to yield any blood reactors, or which, in spite of frequent blood tests and removal of reactors, continue to develop new reactors. In the course of the present study, a cow reacting suspiciously on the blood test and positively on the whey test was identified as a shedder by guinea pig inoculation tests on Nov. 5, 1959. She remained in the herd until Oct. 20, 1960, when her blood titer, which had fluctuated between negative and 1:100 during that year, finally reached 1:200 and she could be legally branded and sold. At the time of her removal, this 120-cow herd lost an additional 7 cattle as reactors after more than a year of blood testing. In another herd, to be reported on separately, the infection chain was broken only by instituting frequent whey tests and segregating reactors. These were then held until they became blood reactors and could be sold. The inconvenience to the dairyman involved was considerable but, after having gone through monthly blood tests for over a year, he accepted it as the only remaining way of eliminating the infection without liquidating the herd.

In the light of our experience with whey and blood tests, we should recommend that the 2 be used jointly in problem herds, that reactors to both tests or either be removed and the owner be compensated for the loss. A close surveillance is advisable over herds harboring blood-suspicious animals. A suspicious ring test in such a herd should be followed immediately by an individual whey test, or even blood and whey tests, with subsequent removal of reactors.

Summary

1) The shedder state of cows with divergent results in their blood-serum and whey-agglutination tests for brucellosis was ascertained by guinea pig inoculation tests.

2) Neither test alone can detect all shedder cattle. In cases of discrepancy between the 2 tests, the whey test identified 14, the blood test as judged by the criteria established by uniform methods and rules,* 1 out of 17 shedders.

3) The whey test appears to be most useful when applied to cows suspicious on the blood test. A positive whey test in 9 out of 12 cases was associated with the shedder state and a negative whey test in 138 of 140 cases was found in cows in which excretion of Brucella organisms could not be demonstrated.

4) Apparently the 2 serologic tests can be used jointly to advantage in problem herds.

*Report of the Brucellosis Committee, Proc. 63rd Annual Meeting, USLSA (1959): 104-119.

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Current Progress in Bloat Control

Two recent methods devised for bloat prevention involve (1) use of antibiotics such as penicillin for short periods and (2) use of antifoaming agents, such as plant or animal oils, as sprays for legume pastures and freshly harvested chopped green legumes.

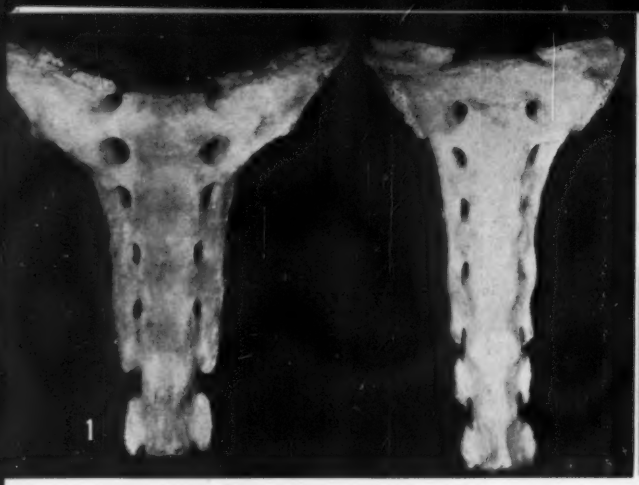
Oil sprays prevent bloat for about 3 hours and have been the most popular method in New Zealand where grass hays are not readily available, the bloat season is relatively long, and soilage is not widely used.—*J. Dai. Sci., 43, (Nov., 1960): 1662*

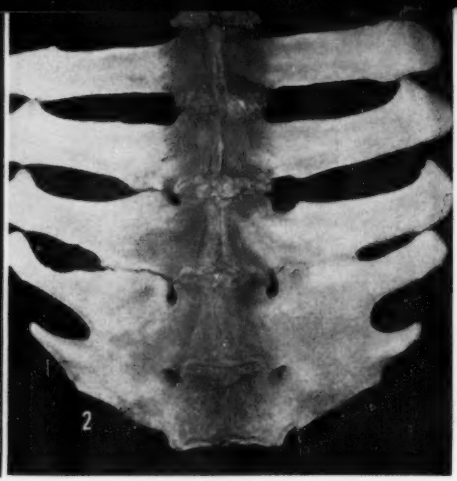
Improved Sampling Procedure for Brucellosis Testing

An improved method of detecting dairy herds affected with brucellosis has resulted in substantial savings in time and labor. Samples of milk are now taken from the milk used in butterfat tests, eliminating the need for getting samples separately from fresh deliveries to the milk plant.

Not only may samples be drawn from butterfat test bottles faster, but also records are more accurate, plant routine is not upset, and more flexible scheduling of tests is possible. Technicians need not revisit plants to collect samples from dairymen who do not deliver milk every day, because each bottle from which the sample is drawn contains milk from several days of deliveries by the producer.

Because of the savings made possible by this new procedure, many states have been able to increase the frequency of tests from 2 to 3 times yearly.—*USDA News Release, Jan. 4, 1961.*





Ankylosing Lesions of the Spine

of the Horse

ROBERT M. STECHER, M.D.
LEONARD J. GOSS, D.V.M.

ANKYLOSING LESIONS of the spine of the horse occur frequently. Therefore, a project was planned to examine skeletal specimens wherever available to differentiate and describe various lesions producing ankylosis and to discuss the significance of these lesions. A total of 245 skeletons was observed. The number of skeletons, sources, and equine species represented are listed (Table 1).

Ankylosis was found between the sacrum and the first 1 or 2 caudal vertebras, in the lateral (transverse articular) joints, in the intervertebral joints, between the spinous processes, between the transverse processes, and between vertebral bodies, the latter occurring either by fusion of the bodies themselves or by bridging across the intervertebral disks. With rare exception, these lesions have been seen only in the domestic horse and in the posterior thoracic, lumbar, or caudal portions of the spine.

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Presented before the Section on Research, 97th Annual Meeting, American Veterinary Medical Association, Denver, Colo., Aug. 14-18, 1960.

Fusion of the first and of the first and second caudal vertebras with the sacrum is shown (Fig. 1). The sacrum is composed of fused vertebras, the fusion including the transverse processes, thus completely surrounding the sacral foramina. The attachment of the caudal vertebras to the sacrum is indicated by a sacral notch. The foramina may be present on one side and the notch on the other, indicating a transitional sacrocaudal vertebra. The presence of such transitional vertebras is considered an anatomical anomaly rather than an ankylosis. This anomaly gives rise to asymmetrical sacrums, the distribution of which is shown (Table 2). Fused caudal vertebras occurred in all equine species studied (Table 2).

The sacrum of a horse with 5 sacral vertebras and an attached caudal vertebra is shown (Fig. 1). On it, there are 4 pairs of sacral foramina indicating 5 sacral vertebras, but notches rather than foramina are present between the last sacral and the first caudal vertebras. The sacrum of a Grevy zebra with 5 sacral vertebras and 2 attached caudal vertebras is shown (Fig. 1).

Little attention has been paid in the

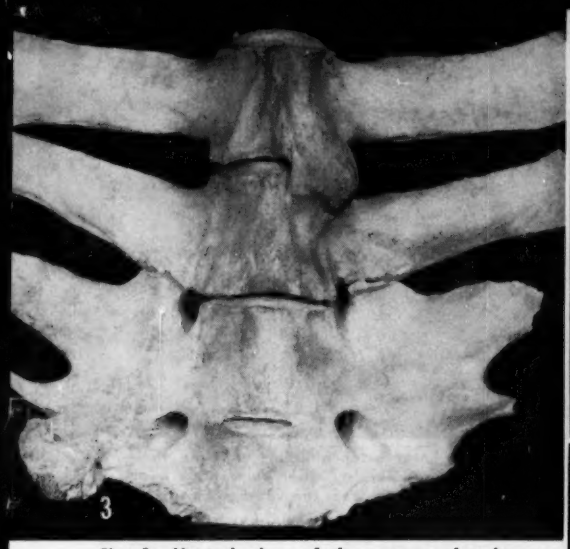


Fig. 1—Ventral view of the sacrum of a horse with 5 sacral vertebras and an attached caudal vertebra. There are 4 pairs of sacral foramina indicating 5 sacral vertebras but only notches between the last sacral and the first caudal vertebras. Sacrum on the right is that of a Grevy zebra with 5 sacral vertebras and 2 attached caudal vertebras.

Fig. 2—Ventral view of the last 5 lumbar vertebras of a horse which originally had 7 lateral transverse joints, 3 of which have been fused. Epiphyseal plates on the caudal surface of vertebral bodies still persist, indicating that this is an immature horse.

Fig. 3—Ventral view of L3 to L6 with fusion of lateral joints and adjoining edges of L5 and 6 and the lateral halves of the intervertebral disk. An isolated bridge is seen between the left sides of the bodies of L3 and 4 and an osteoma arising from the caudal edge of the ventral surface of the right transverse process of L6.

Fig. 4—In this ventral and a cross-sectional view of L5 and L6, fusion of the bodies of the vertebras and of the lateral transverse joint may be seen.

Fig. 5—Laterial view of the spine of the same horse as in Figure 3 with fusion of the spinous processes, the intervertebral joints, and the thoracic portion of the bodies of T18 and L1. The bodies were not fused because the intervertebral disk was present.

TABLE 1—Sources of Equine Spines

Species	Source															Total
	1*	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Domestic horse	24	7	8	4	4	2	2	1	....	3	6	5	....	....	28	94
Shetland pony	3	....	....	....	1	....	....	....	2	....	1	....	....	....	1	8
Zebra (species not identified)	30	8	3	....	3	3	3	5	2	....	....	3	....	....	....	60
Grevy zebra	9	4	2	....	....	....	....	....	2	....	....	....	....	....	....	17
Hybrid (mule)	5	....	2	....	....	....	....	....	....	....	....	....	....	....	1	8
Ass	6	....	2	....	3	....	1	2	2	....	....	....	....	....	2	18
Hemione	5	2	1	....	....	....	....	....	1	....	....	....	....	....	....	9
Arabian horse	8	1	....	....	....	....	....	1	....	....	....	....	....	....	....	10
Prjevalsky horse	7	2	....	....	....	....	....	....	5	2	....	....	4	1	....	21
Total	97	24	18	4	11	5	6	9	14	5	7	8	4	1	32	245

*(1) American Museum of Natural History, New York, N. Y. (2) United States Museum of Natural History, Smithsonian Institution, Washington, D.C. (3) Museum of Comparative Zoology, Harvard University, Boston, Mass. (4) School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa. (5) Chicago Museum of Natural History, Chicago, Ill. (6) Cleveland Museum of Natural History, Cleveland, Ohio. (7) Musée Royal de Congo Belge, Tervuren, Belgium. (8) Institut Royal des Sciences Naturelles de Belgique, Brussels. (9) Laboratoire d'Anatomie Comparée, Muséum National d'Histoire Naturelle, Paris. (10) Zurich Zoological Society, Zurich. (11) Veterinär-Anatomisches Institut an der Veterinär-Medizinischen Fakultät der Universität, Zürich. (12) Hochschule für Bodenkultur, Vienna. (13) British Museum, London. (14) Institut für Agrikulturelle Zoologie, University of Halle, Germany. (15) Private collection.

Fig. 6—Transverse section of the spine cut through the intervertebral joints showing their complete obliteration of bony fusion. Part of the joint spaces persist, other parts have been obliterated by bony fusion. A large abutting spur is seen arising from the veterbral body.

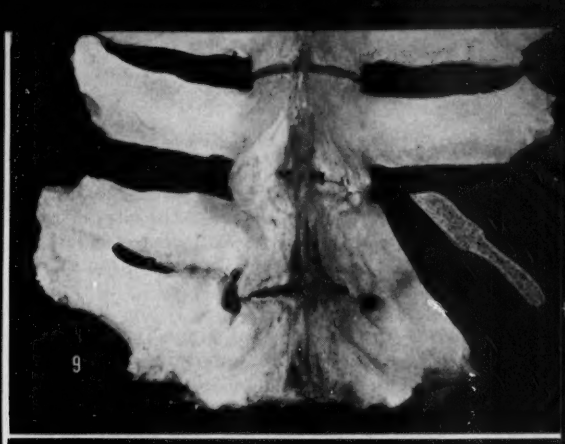
Fig. 7—The last thoracic and first 3 lumbar vertebras are ankylosed into a solid unit. Ossification of the interspinous ligament is seen to be complete between T18 and L1, partial between L2 and L3, and starting between L1 and L2. The intervertebral joints between these vertebras are completely fused and were found, on cross section, to have been obliterated without a trace between L2 and L3. The bases of the spinous processes, the thoracic portion of the vertebral bodies, and the bases of transverse processes are also fused. No bridging was seen between the vertebral bodies. A semicircular area of normal joint surface is seen projecting ahead of the spinous process. This joint was surrounded by massive bone formation completely enclosing it before it was broken apart.

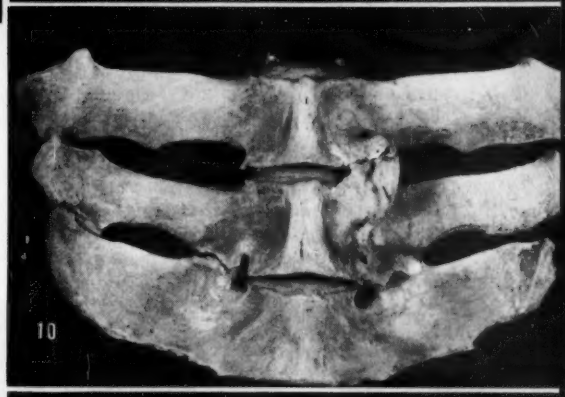
literature to lateral transverse joints, those auxiliary articulations on the posterior lumbar vertebras of all equine species. The distribution in different equine species with 5 and 6 lumbar vertebras is shown (Table 3). Fusion of lateral transverse joints is common in the domestic horse, the Arabian horse, and the mule. It occurs rarely in horses with only 5 lumbar vertebras. It has never been found in the zebra, donkey, or Prjevalsky horse. The ventral view of the last 5 lumbar vertebras of a horse which

TABLE 2—Number of Vertebras Limited to the Lumbar and Sacral Regions Found in 245 Equine Specimens

Equine specimen	No. of specimens	5 lumbar vertebras	5 lum. vert. plus ½ caudal	6 lumbar vertebras	Sacral vertebras unknown	4 sacral vertebras	4 sacral vertebras plus ½ caudal[1]	4 sacral vertebras plus 1 fused caudal[2]	4 sacral vertebras plus 2 fused caudal[2]	5 sacral vertebras	5 sacral vertebras plus ½ caudal[1]	5 sacral vertebras plus 1 fused caudal[2]	5 sacral vertebras plus 2 fused caudal[2]	6 sacral vertebras	6 sacral vertebras plus 1 fused caudal[2]
Domestic horse	94	5	....	....	....	....	....	....	....	3*	....	2*	....	....	....
	....	....	2	....	....	....	1**	....	....	1**	....	....	....	....	....
	....	....	....	87	12†	8†	2†	7†	....	43†	1†	14†	....	....	....
Shetland pony	8	....	....	8	....	1	....	1	....	5	....	1	....	....	....
Zebra (species not identified)	60	5	....	....	....	....	....	....	....	1*	....	2*	1*	....	1*
	....	....	....	55	3†	5†	3†	3†	3†	21†	....	11†	4†	....	2†
Grevy zebra	17	1	....	....	....	....	....	....	....	1*	....	....	....	....	....
	....	....	....	16	2†	....	1†	2†	....	4†	....	5†	1†	1†	....
Hybrid (mule)	8	1	....	....	....	....	....	....	....	1*	....	....	....	....	....
	....	....	....	7	....	....	1†	1†	....	2†	....	2†	1†	....	....
Ass	18	14	....	....	1*	....	2*	....	....	5*	....	2*	1*	3*	....
	....	....	....	4	....	....	....	....	....	2†	....	2†	....	....	....
Hemione	9	9	....	....	....	2*	....	1*	....	2*	....	2*	1*	1*	....
Arabian horse	10	2	....	....	....	....	....	....	....	2*	....	....	....	....	....
	....	....	....	8	2†	1†	1†	....	....	2†	1†	1†	....	....	....
Prjevalsky horse	21	11	....	....	....	....	....	....	....	7*	....	4*	....	....	....
	....	....	....	10	1†	3†	....	....	....	4†	....	2†	....	....	....
Total	245	48	2	195	21	20	11	15	3	106	5	50	9	5	3

[1]Asymmetrical sacrums. [2]Sacrocaudal fusion. *From specimen which had 5 lumbar vertebras. **From specimen which had 5 lumbar vertebras and ½ caudal vertebra. †From specimen which had 6 lumbar vertebras.





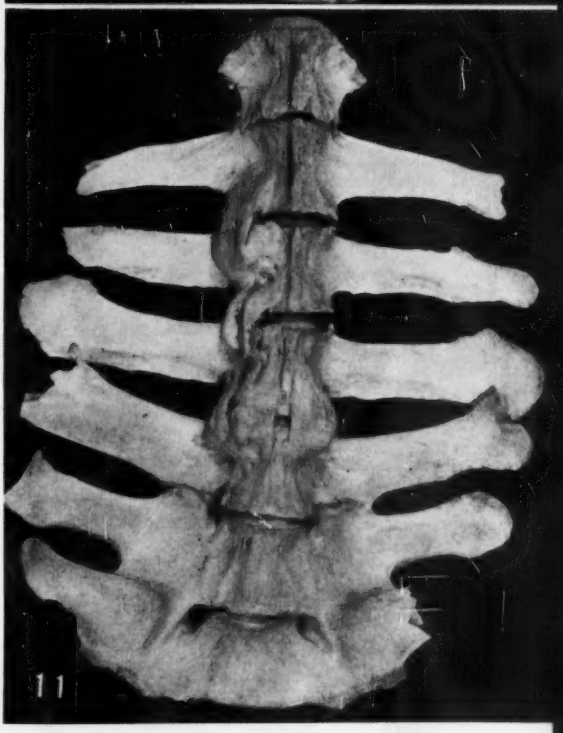


Fig. 8—Ankylosis of L4 and L3 produced by a stout bony bridge between the articular processes but not involving the joint. Ankylosis of the next 2 vertebras, L5 and L4, occurred by means of a stout bony bridge across the intervertebral disk on its right anterior surface. The lateral transverse joints between L6 and L5, not seen in the picture, were also fused.

Fig. 9—In the ventral view of L3 and L6, there is a stout bony bridge on the right and abutting spurs on the left between L4 and L5 and fusion of the left lateral transverse joint between L5 and L6. The latter is seen in ventral and cross-sectional views.

Fig. 10—In the ventral view of L3 to L5, a massive irregular bridge between the left sides of the bodies of L3 and 4 is seen. This bridge fell apart on maceration.

Fig. 11—In the ventral view of the 6 lumbar and the last thoracic vertebras of a horse, there is fusion of lateral transverse joints between L6 and L5, the left lateral transverse joint between L5 and L4, bilateral bridging between L4 and L3, and right-sided bridging between L3 and L2 and L2 and L1.

originally had 7 lateral transverse joints, 3 of which were fused, is shown (Fig. 2). The epiphyseal plates on the caudal surface of the vertebral bodies still persist, indicating that this was an immature horse.

Fusion of lateral transverse joints is a necessary preliminary stage to fusion of the adjacent edges of the transverse processes of the last 2 lumbar vertebras. Such fusion is often nearly complete, leaving only a short tip of the transverse processes of the last lumbar vertebra free. An example of this may be seen in the ventral view (Fig. 3) of L3 to L6 with fusion of the lateral transverse joints and adjoining edges of L5 and L6 and the lateral halves of the intervertebral disk. An isolated bridge is visible between the left sides of the bodies of L3 and L4 and an osteoma is seen arising from the caudal edge of the ventral surface of the right transverse process of L6. This osteoma, however, was not fused to the sacrum. Fusion of the tips

of the transverse processes may also occur independently of fusion of the lateral transverse joints or of the adjacent edges of the transverse processes. No tabulation of this phenomenon has been made but an example is shown (Fig. 9).

A rare and perhaps clinically silent ankylosing lesion fusing the bodies of 2 adjacent vertebras was seen only once. This occurred between the last 2 lumbar vertebras (Fig. 4). This specimen has been split longitudinally to show the ventral surface and the cut surface. The disk has completely disappeared leaving only a joint line on the cut surface and only a slight remnant of the division on the ventral surface. The one lateral transverse joint shown has also fused and disappeared, but there is no other fusion of the adjoining edges of the transverse processes. This spine had 5 lateral transverse joints, the one between L4 and L5 being unilateral. There was also one other abnormality in this spine, complete fusion by bony ankylosis of the spinous processes of T18 and L1. This fusion involved the entire length of the processes, intervertebral joints, and the thoracic portion of the vetebral bodies (Fig. 5). Fusion did not involve the bodies because the disk was preserved.

Ankylosis of adjoining vertebral segments also occurs because of involvement of the intervertebral joints. This may be due to actual fusion of the bones, with obliteration of the joint spaces (Fig. 6). A similar process involved another specimen, resulting in obliteration of the intervertebral joints, ossification of the interspinous ligaments, and fusion of the bases of the transverse processes of T18 to L3 (Fig. 7). The vertebral bodies and the intervertebral disks are otherwise completely free and uninvolved. The appearance of the intervertebral joint on the anterior aspect of T18 in-

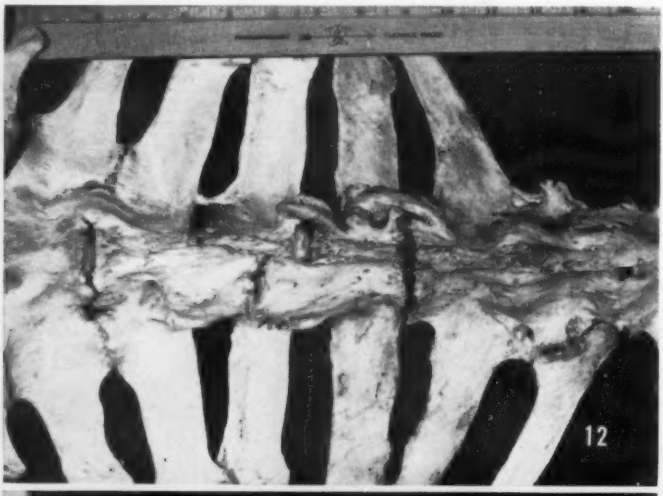


Fig. 12—In the ventral view of spine from T17 to L6, there was bony bridging across each disk from below upward. Bridging occurred on the left, on the right and bilaterally. The caudal ends of bridge from L1 and from L2 were not attached allowing L2 to move.

Fig. 13—The same spine (shown in Figure 12) from L1 to T14 has extensive bony bridging or abutting spurs. This spine was immobilized from L5 to T15 except between L1 and L2.

dicates that the intervertebral joint in this segment was not fused but was simply covered by bone connecting the articular processes. On cut section, the joints between L1 and L2 were absolutely obliterated. A bony mass may extend across the articular processes and not involve the intervertebral joint (Fig. 8). Ankylosis by bony bridge was also seen in this specimen between the bodies of L4 and L5 on their right anterior surface. The lateral transverse joints, not seen, between L5 and L6 were also fused. Any of these ankylosing lesions may involve 1 to 8 intervertebral joints and they may occur in combination with any or all of the other ankylosing lesions between the same 2 or other adjoining vertebras.

Another type of immobilization consists of bridging from one vertebral body to another across the intervertebral disk. This lesion varies markedly in degree. The process, in its mildest form, before ankylosis occurs, consists of spurs along the sides of adjacent vertebras. In a more advanced stage, these spurs meet but do not fuse, and in the ultimate stage there is stout, continuous bony bridging. Such bridging may occur as an isolated phenomenon across one side of an intervertebral disk (Fig. 3). It may occur as a series of bridges often alternating from side to side (Fig. 12 and 13). It occurs not infrequently cephalad to fused lateral transverse joints (Fig. 9) with a stout bony bridge across the right side and abutting spurs on the left side between L4 and L5 and fusion of the left lateral transverse joint between L5 and L6, shown both in ventral view and in cross section. A massive projecting bridge (Fig. 10) seen in the left side of the anterior surface of L3 and L4 seemed at first to be fused but it fell apart on maceration.

The individual lesions described above are of increased functional significance when they occur in combination in an individual spine. Almost every conceivable combination was observed. Combinations of fused lateral transverse joints and nearby bony bridging have been described (Fig. 3, 8, 9, and 11) and of fused lateral transverse joints, vertebral bodies, and spinous processes (Fig. 4 and 5). Another spine not shown had ankylosis of lateral transverse joints between L6 and L5, bilateral bony bridges between L5 and L4, left-sided bridges between L4 and L3 and L2. There were abutting spurs between L1 and T18 on the left.

A similar spine is shown (Fig. 11). There was fusion of lateral transverse joints between L6 and L5, bilateral bony bridging between L4 and L3, and right-sided bridging between L3 and L2 and L2 and L1. Intervertebral joints were fused on the left between L4 and L5 and bilaterally between L2 and L1 and L1 and T18. Actually, motion was preserved between L2 and L3 because the bridge was not attached to L3.

In another specimen, there was immobility of the spine from T14 to L5 with the exception of L2 which was movable with its neighbor on each side. As shown (Fig. 12 and 13), there was stout bony bridging on one side, the other side, or on both sides as the process was followed from L5 to T15. There were abutting spurs to T14. On the dorsal side, intervertebral joints were fused

TABLE 3—Distribution of Lateral Transverse Joints Observed in 243 Equine Specimens

		Horses with 5 lumbar vertebras				Horses with 6 lumbar vertebras			
	Total No. of equine specimens	Lateral transverse joints not formed	No. of spines	Sacrum-L5	L5-L4	No. of spines	Sacrum-L6	L6-L5	L5-L4
Domestic horse	94	1	7*	14	14	86**	172	103(69)†	74(2)†
Shetland pony	8	....	....	....	....	8	16	14(2)†	2
Zebra (species not identified)	58	....	5	10	10	53	106	106	54
Grevy zebra	17	1	1	2	2	15	30	30	19
Hybrid (mule)	8	1	1	2	2	6	12	8(4)†	5
Ass	18	1	13	26	24	4	8	8	....
Hemione	9	....	9	18	18	....	....	....	....
Arabian horse	10	....	2	4	4	8	16	11(5)†	7
Prjevalsky horse	21	3	11	22	22	7	14	14	....
Total of all species	243	....	....	....	....	....	....	....	....

*Two horses had 5½ lumbar vetebras. **One horse had 7 transverse joints, 3 of which were ankylosed.
†Ankylosed joints.

Fig. 14—The first caudal vertebra with the epiphyseal plate of the last sacral vertebra attached by smooth bony bridging across the left dorsal surface of the body.

between L4 and L3 on the right and bilaterally from L1 to T16. There was extensive irregular bone proliferation about these joints between L1, L2, and L3 without involvement of the joint surfaces. The thoracic portions of the vertebral bodies, the bases of the transverse processes, and the bases of the spinous processes were involved.

Discussion

Ankylosis of the spine in the equine species occurs in various ways. Some lesions are undoubtedly due to disease, others are due to developmental anomalies. The latter include fusion of the caudal vertebras to the sacrum and fusion of lateral facets with ankylosis of lateral transverse joints. Fusion of caudal vertebras to the sacrum was found in over half of the skeletons examined and occurs in all equine species studied (Table 2). Asymmetrical sacrums with one sacrocaudal transitional element were seen in half of the animals with 6 sacral vertebras. Asymmetrical sacrocaudal vertebras and fusion of caudal vertebras to the sacrums seems to occur in an effort to elongate the sacrum and to correct an anatomical weakness.

Fusions described above are not the result of advanced age, because they have been seen in immature horses before the epiphyses have disappeared. The distal epiphyseal plate of the sacrum attached to the adjoining caudal vertebras by a stout bony bridge on the left half of the thoracic surface of the vertebral bodies is shown (Fig. 14).

The number and distribution of lateral joints in various equine species and in horses with 5 and 6 lumbar vertebras are shown (Table 3). The tabulation is so arranged as to indicate the number of lateral transverse joints at each level of the spine. At lower levels, this is twice the number of specimens. Odd numbers are due to asymmetrical distribution of lateral transverse joints. Fusion was found in 40 per cent of lateral transverse joints between the last 2 lumbar vertebras in the domestic horse with 6 lumbar vertebras but never in horses with only 5 lumbar vertebras. Fusions were found with about equal frequency in Shetland ponies, hybrids, and Arabian horses. Ankylosis of lateral transverse joints was not seen in other species. Such fusion seldom occurs in wild species perhaps for 2 reasons. Such animals have always to depend upon fleetness of foot to avoid predators. They are never called upon to bear burdens on their backs or to haul a load.

Ankylosis of intervertebral joints usually occurs as a multiple lesion not only with involvement of several intervertebral joints but in association with ankylosis of lateral transverse joints and with bridging. An irregular pattern is produced involving one side or the other, starting with fusion of lateral transverse joints near the sacrum followed by fusion of intervertebral joints and then bridging, these lesions sometimes extending forward to the midthoracic spine. Fusion of intervertebral joints usually occurs bilaterally, but bridging may alternate from side to side. During the developmental stage, at least, fusion of intervertebral joints is undoubtedly painful. It interferes with function and efficiency and thereby would render the animal vulnerable to attack by beasts of prey. Fusion of intervertebral joints has not been found in animals not living in captivity.

Immobilization of the spine by bridging the intervertebral disk between 2 adjacent vertebral bodies begins as abutting spurs but develops by thickening and ossification of the lateral longitudinal ligaments. This, too, may occur as a unilateral isolated lesion. It may occur as part of a complex system partly unilateral, partly bilateral, extending from the middle of the thoracic spine to the last lumbar vertebra and rendering the affected spine completely stiff. This lesion has not been examined as a fresh specimen but the intervertebral disks do not seem to have been deformed; the subchondral plate of adjacent vertebras

seem to be parallel and a uniform distance apart, and the plates themselves are never distorted or perforated. This finding is in marked contrast to the condition found in similar circumstances when bridging has occurred in man or the gorilla. The extensive development of bridging alone or bridging associated with fusion of intervertebral joints and lateral transverse joints produces extensive areas of completely stiffened spine.

The exact causes of these changes in the spine are not known. Further investigation with correlation of case histories, clinical signs, and pathologic findings are highly desirable. Fusion of caudal vertebras to the sacrum and fusion of lateral transverse joints are probably developmental or anatomical anomalies of little or no clinical significance. Ankylosis, fusion, or significant spur formation was not seen between the last lumbar vertebra and the sacrum. As described in a previous study, significant flexion of the lower spine is possible only between the last lumbar vertebra and the sacrum. This flexion is limited but it is important and it is never impaired. On the other hand, flexion of the lumbar spine is restricted and further stabilization by fusion of the fifth and sixth lumbar vertebras seems to be advantageous.

Fusion of intervertebral joints has some similarities, but also significant differences from a similar disease in man, ankylosing or rheumatoid spondylitis. In man, this disease starts as a sclerosis and fusion of the sacroiliac joints and proceeds to fusion of the intervertebral and costovertebral joints and finally to ossification of the lateral longitudinal ligaments of the spine. It is often associated with disabling deformity and ankylosis of the hips. In horses, ankylosis of intervertebral joints may or may not be associated with extensive bridging. Involvement of sacroiliac joints and of the hip is unknown, and ankylosis of the lumbosacral joint never occurs.

Bridging in horses may result from trauma, especially when it occurs as an isolated lesion; a strain, a fall, or an excessive burden may stretch a lateral longitudinal ligament with resulting hemorrhage, reaction, and ossification. It seems unbelievable that any one accident could produce so generalized an injury as to account for some of the conditions described (Fig. 11, 12, and 13). Furthermore, any injury producing one isolated lesion might be so painful and disabling as to force the victim to so restrict his activities as to prevent an extension of the process. In the absence of better evidence, it seems unlikely that these diseases are due to infection or nutritional deficiencies. An adequate explanation for bony bridging is not apparent.

Arthritis was never seen in the lumbosacral joint, the sacroiliac joint, or the hip. This is in marked contrast to observation of skeletal material of human beings and of gorillas, in both of which species this is fairly common.

Summary

On observation of 245 spines of various equine species, several ankylosing lesions were seen. These include fusion of caudal vetrebras to the sacrum and fusion of lateral joints in several equine species and are probably anatomical anomalies. In the domestic species alone, ankylosis also occurs by fusion of intervertebral joints and bridging across the intervertebral disk either as isolated lesions or as multiple lesions but at times involving large portions of the spine. These lesions have been compared to similar lesions in man and in the gorilla and their significance discussed. No adequate explanation of these lesions is at present available.

Simple Hog Cholera Test Needed

In order to make progress in eradication of hog cholera, there is an urgent need for a rapid test for this disease. Present tests requiring the use of hogs are long and expensive, costing from $300 to $1,000 each.—*Nat. Hog Farmer (Dec. 1960):10*

Parasite Control in Horses

E. R. WALKER, D.V.M.

HORSES debilitated by heavy strongyle infections respond better to treatment with phenothiazine powder given repeatedly in small doses over a period than to a single heavy dose. A commercially prepared phenothiazine powder, formulated as follows, has been employed successfully: 53% phenothiazine; corn sugar, 1 Gm./lb., as a sweetening agent; 42% carob flour; and a trace of oil of anise. A mature horse is given 1 tablespoonful in the feed once daily for 4 days. This treatment is repeated in 2 weeks.

Two weeks after the last treatment with this phenothiazine powder mixture, therapeutic worming is performed. For this purpose, a stock solution of phenothiazine, using a commercial phenothiazine preparation containing 12.5 Gm. of phenothiazine per ounce, is used. The stock solution is prepared by adding enough water to 20 oz. of the commercial phenothiazine preparation to make 1 gallon. This stock solution will contain 30.0 Gm. of phenothiazine per pint. Diluting the phenothiazine as described offers 3 advantages: (1) The mixture flows easily through a stomach tube. (2) The mixture disperses well throughout the alimentary canal because of the added volume. (3) The horse tolerates the low concentration of phenothiazine more easily than it would a heavier concentration.

It is not necessary to fast a horse prior to worming it. As a matter of fact, a relatively empty alimentary tract may contribute to development of colicky pains.

To worm healthy horses, weighing 800 to 1,000 lb., 1 pint of the stock solution and 2, 3-dram capsules of carbon disulfide are given by stomach tube. For horses of other weights, the dosage is adjusted proportionately. A 3-month-old colt is given about ¼ pint of the solution and ½ to 1, 3-dram capsule of carbon disulfide. A plastic funnel inserted into the stomach tube makes administration of the preparation much easier than if a stomach pump were used. Using this technique, there is less loss of medicine and the veterinarian is able to move out of an unruly horse's way easily.

After administering the medication, the stomach tube should be flushed with ½ to 1 pint of cool water. Hot water is not advisable because it may vaporize some of the carbon disulfide.

Adequate exercise should be given the horse after worming. If the horse has been stabled, it should be turned into an exercise pen or led for approximately 30 minutes once a day for 2 or 3 days. If the horse has been pastured, it should be turned back into pasture after worming.

The best results from therapeutic worming of horses will be achieved if worming is performed once in early spring and again after the first frost in the fall. The worming should be performed twice with 2 weeks between each worming. If some horses cannot be wormed at that time, they should be isolated in a pasture by themselves and given as much area for grazing as possible until the worming can be performed.

After therapeutic worming, all horses should be given continuous prophylactic treatment with the phenothiazine and carob flour mixture mentioned. The dosage for a weanling is 1 teaspoonful a day for 4 days; this treatment should be given once a month. The dosage for adult horses is a tablespoonful for the same length of time once a month. This medicine should be given to each horse individually. Horses over 2 months old that are going to be stabled or kept in close quarters should be given the mixture all year long.

To prevent reinfection after worming, manure piles in large pens should be scattered with a harrow once a week, so that the sunlight may aid in destroying eggs and larvae. Stalls and smaller areas should have the floors or ground saturated with a strong saline solution. Pools of stagnant water should be drained; drinking water should be located so that there is minimum chance of contamination.

The author is an equine practitioner in Pawhuska Okla.
Presented before the Combined Sections on General Practice and Surgery and Obstetrics, 97th Annual Meeting, American Veterinary Medical Association, Denver, Colo., Aug. 14-18, 1960.

Handling Femoral and Tibial

Fractures in the Dog

WILLIAM A. HOWARTH, D.V.M.

FRACTURE REPAIR in the majority of dogs is a rather simple procedure, requiring common sense and observance of a few basic principles. Fracture repair, like the repair of any wound, is accomplished in a series of steps: diagnosis, immobilization, adequate nursing care and treatment, and prevention of complications.

External Immobilization of Femoral Fractures

Often external immobilization is necessary for transverse, oblique, and comminuted fractures when intramedullary pinning is desired. In oblique fractures, the femur has a tendency to slip and rotate because of the angle of the fracture and because of tension due to the heavy musculature in the region. Modified Thomas splints may be used advantageously to prevent rotation and slippage. A walking Thomas splint is particularly useful because it allows the dog freedom from encumbering foot tapes and enables him to get around in a somewhat natural manner. Thomas splints should not be used as traction apparatus in these types of fractures because they tend to restrict circulation and do not sufficiently reduce tension of the heavy muscles.

Kirschner pins and clamps may be used in fractures of the head of the femur when circulation to this part has not been damaged enough to result in aseptic necrosis of the head. Transfixation with Kirschner splints may also be used advantageously in femoral fractures where rotation is likely to occur.

External Immobilization of Tibial Fractures

Because of their ability to limit rotation, Thomas splints have been widely used to immobilize spiral and oblique fractures of the tibia. Careful alignment of tibial fractures is especially important because of the relatively light musculature in this region; improper alignment of tibial fractures is obvious. Since external splintage will aid maintenance of proper alignment, its use is recommended. External fixation with Kirschner splints has been used advantageously on tibial fractures immobilized with or without intramedullary pinning.

Use of Antibiotics

In uncomplicated fracture cases, a combination of penicillin and streptomycin should be administered daily for 3 to 10 days if the dog is hospitalized or can be returned to the hospital daily for injections of antibiotics. Preoperatively, antibiotics should be given to dogs on which surgery will be delayed because of shock, hemorrhage, or other complications. A dosage of 200,000 to 600,000 units of penicillin and 0.5 to 1.5 Gm. of dihydrostreptomycin is adequate. Penicillin and streptomycin should be given for 10 to 14 days and even longer in complicated cases or in patients in which infection is suspected. The principal complication which arises in connection with open reduction of fractures, compound fractures, and fractures where bones and abrasions are present is osteomyelitis.

When extended hospitalization or daily injections of antibiotics are not practical, orally administered antibiotics may be prescribed to be given at home by the owner. Chloramphenicol, given in 3 doses daily at a dose rate of 25 to 50 mg./lb. of body weight for 3 to 10 days, or oxytetracycline is recommended. If the patient is to be sent home soon after surgery, it is advantageous to give these antibiotics intravenously twice daily while the patient is hospitalized, prior to prescribing orally administered antibiotics. Comparable antibiotics may be substi-

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tuted for those mentioned if desired. In dogs in which specific bacterial infections are suspected, cultures should be made and antibiotic sensitivity testing employed, in order to apply therapy efficiently.

Duration of Hospitalization

Dogs with fractures seem to recover more rapidly if hospitalized up to about 2 weeks following surgery. In small areas, movement is limited and, consequently, the fracture region is in less danger of traumatic abuse. Also, the fracture can be observed regularly in case complications arise. While the patient is in the hospital, any need for external splintage can be determined readily and splints applied before irreparable damage has occurred. If the patient must be sent home early, it should be returned for routine examination at least once a week while the part remains immobilized.

How to Determine the Stage of Healing

The stage of healing of the affected part may be determined by observing how the patient uses the fractured leg. Also, consideration should be given to the age of the patient and the general state of nutrition and health. Fractures heal more rapidly in young animals and in those that are in general good health.

Stage of healing may be determined by palpation of the fracture site to detect development of callus formation. Callus formation can be palpated relatively easily in tibial fractures, but it is more difficult in femoral fractures due to the heavy musculature in the femoral region. Palpation will also reveal pain if it persists. Degree of callus formation may also be determined by radiography.

Time alone is not a reliable indication of the state of fracture repair.

General Recommendations for Treatment of Fractures

1) Always use the simplest method that will adequately handle the fracture.

2) In open reduction, use aseptic techniques.

3) Avoid removal of bone fragments unless necessary.

4) Use external immobilization if it appears advantageous.

5) Employ radiography before and after repair of fractures to determine extent of fracture and stage of healing.

6) Employ antibiotic therapy when open reductions are to be performed or wounds are associated with the fracture.

7) Offer adequate nursing care and prevent injuries to affected parts.

8) Be especially careful to avoid injury to vital structures, such as nerves, muscles, or large blood vessels.

9) Maintain proper nutrition. Older dogs with nephritis, for example, need special diets.

Distemper Antibodies Persist for 21 Months; 2-Injection Method Useful

In a Romanian study, attenuated live virus canine distemper vaccine, Onderstepoort strain (Haig), was administered to 1,939 dogs of various ages and breeds and to wild animals susceptible to distemper. Specific neutralizing antibodies were detectable in the serum of vaccinated dogs as early as 6 to 7 days after vaccination, and for 21 months thereafter.

A single injection of vaccine afforded sufficient protection for young dogs over 5 months old and in good condition. Two injections of vaccine were recommended for young dogs vaccinated for the first time after weaning and for those in poor condition or parasitized. The second injection was given 6 to 8 weeks after the first.—*Prob. de Epizoot., 10, (1960): 68.*

Probable Thallium Poisoning

with Concurrent Mycotic Dermatitis in a Dog

C. A. HJERPE, D.V.M.
T. C. VAUGHN, D.V.M.

A MALE Toy Poodle-Cocker Spaniel crossbred dog, 4 months old, was first examined on Aug. 8, 1959, when he was vaccinated with a modified, live virus, distemper-hepatitis vaccine of chicken embryo origin. At this time fecal examination was negative for parasites, and the dog seemed in good health.

The next examination was Sept. 4, 1959, when otitis externa had developed in the left ear. A sebum-dissolving agent* was instilled. Several hours later the ear was cleaned; the dog was sent home, and an otic ointment** was dispensed. The next day, the owner brought the dog back because of generalized pruritus centering around the anus and eyes. The anal sacs were expressed and an ophthalmic ointment† was dispensed.

The dog was returned 2 days later on September 7. He had vomited several times during the previous day. His appetite was poor and the pruritus was still present. The dog had removed hair and reddened the skin in many spots, due to his persistant chewing and scratching. The main areas affected were the skin of the inside of the thighs, around the eyes and the anus, the upper lip under the nose, and the inside of the forelegs. The rectal temperature was 103.8 F. The canals of both ears were erythematous and crusty. An allergy to the otic ointment was suspected at this time. The dog was hospitalized, the anal sacs were expressed again, and 25 mg. of a tranquilizer* was administered intravenously to control the self-mutilation. Antihistamine** (0.25 cc.) and a corticosteroid† (20 mg.) were given by injection at this time. Instead of otic ointment, otic drops‡ were given. The ears were treated daily with the latter, as were the eyes with opthalmic ointment. Prednisone† (10 mg.) was administered daily. During this time, repeated skin scrapings were made but were negative for mange mites. Examination of the hair and skin under the Wood's light was negative. During the 3 days that the dog was hospitalized, the redness began to disappear from the skin lesions and the pruritus abated. The patient was discharged on September 10.

The dog was admitted for hospitalization again on September 12. Vomiting had begun again. The dog refused to eat and was listless. In spite of the administration of oral prednisone, 5 mg. daily at home, the pruritus had returned. Mucopurulent ocular discharge, with corneal haziness, and a slight crusting just inside the nostrils were present. Rectal temperature was 101.6 F. The skin areas, which formerly had been hyperemic, were now thickened, leathery, cracked, and brown. The lower extremities and eyelids were most severely affected. The hair on any part of the body could be plucked out easily.

Penicillin and streptomycin and 20 mg. of prednisone were administered by injection. The coat that was still present was clipped short, and mineral oil was applied to the lesions. Over the top of the back, the lesions were discrete, scattered, and from ¼ to ½ inch in diameter, becoming contiguous as the extremities were approached. The dog was hospitalized again. On Sep-

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The authors thank Drs. T. Benson and C. G. Rickard, Pathology Department, New York State Veterinary College, Cornell University, Ithaca, N. Y., for the histopathologic examination.

*Sebumsol, Parlam Corp., Englewood, N. J.
**Nolvapent, Fort Dodge Laboratories, Fort Dodge, Iowa.
†Spad ointment, Haver-Lockhart Laboratories, Kansas City, Mo.

*Promazine, Fort Dodge Laboratories, Fort Dodge, Iowa.
**Pyrihistine, Pitman-Moore Co., Indianapolis, Ind.
†Meticorten, Schering Corp., Bloomfield, N. J.
‡Typacaine, Warren-Teed Products Co., Columbus, Ohio.

tember 13, penicillin, streptomycin, and 10 mg. of prednisone were given by injection and an ophthalmic solution* was instilled in the eyes 3 times a day. The dog refused to eat, and was listless. On September 14, a copious, thin, purulent nasal discharge was present and both corneas were badly ulcerated. The dog was treated with penicillin, streptomycin, 10 mg. of prednisone, B complex vitamins, 50,000 units of vitamin A, protein hydrolysate, and 5% dextrose and physiologic saline solution. Late in the day, the dog was moribund and was euthanatized with an overdose of pentobarbital sodium, intracardially.

Postmortem Findings

Postmortem examination was performed immediately. No gross internal lesions were present. No new external lesions were found.

On histologic examination of the skin, many mold spores were found, indicating the presence of a ringworm-like dermatitis.

On examination of the lungs, there were areas containing bacterial colonies and fibrin, without leukocytic accumulations. There appeared to be an inhalation type of pneumonia in an animal lacking leukocytes. It is not known whether this lack of a leukocytic response to the infection resulted from thallium intoxication or medication with corticosteroids. Unfortunately, hematologic or bone marrow studies were not performed. On study of sections from brain, liver, and kidneys, significant lesions were not seen.

Kidneys and liver were submitted to the New York State Troopers' Laboratory for spectroscopic analysis. Thallium was the only toxic material found in detectable amounts.

*Florinef-s Ophthalmic Sol, E. R. Squibb and Sons, New York, N. Y.

Discussion

As far as could be determined, the dog had not had access to ant buttons or rodenticides, which are the usual sources of the thallium. At the time the dog was first affected, the owner's house was being painted. Perhaps paint was the source of thallium.

Evidence of a concurrent fungal dermatitis was interesting. It is possible that the continuous corticosteroid and antibiotic therapy may have lowered skin resistance to a subclinical mycotic infection, which resulted in the spore formation that was discovered histologically. Possibly, the spores were those of a nonpathogenic saprophytic fungus that was growing in fissures in the skin lesions. The possibility that thallium toxicity might produce a loss of epidermal resistance to fungi must not be ignored. Unfortunately, the presence of any concurrent mycotic dermatitis was not suspected until the results from histologic study were received, and no attempt could be made to culture the skin for fungi.

Summary

A case of probable thallium intoxication with concurrent mycotic dermatitis was diagnosed. The symptomatology was characterized by vomiting, anorexia, listlessness, conjunctivitis, keratitis, rhinitis, otitis externa, and generalized pruritus with uniform loss of hair. The skin lesions were most severe on the extremities, beginning with erythema and depilation, and rapidly progressing to a thickened, leathery, fissured condition.

Aerosol and Intravenous Exposures of Dogs to Distemper Virus Yield Comparable Results

In tests involving 56 Beagle pups ranging from 5 to 12 weeks of age, it was found that neither aerosol exposure nor intravenous inoculation of virulent canine distemper virus produced signs of illness or active immunity because protective antibodies had been transferred from their mothers. Results of these 2 methods of exposure were comparable.—*Cornell Vet., 50, (Oct., 1960): 514.*

Epidemiology of

Paratyphoid Infections in Turkeys

—*Species Encountered and Possible Sources of Infection*

L. C. GRUMBLES, D.V.M.
A. I. FLOWERS, D.V.M.

SOME OF the methods of transmission and sources of infection for the paratyphoid organisms in turkeys have been known for many years. The source of the initial infection in many flocks, however, often cannot be reliably established. The extremely wide host range for this group of agents has often been used to explain infections of unknown origin. In some cases, no doubt, the hatchery has been unjustly incriminated as the primary source of the infection.

In recent years, the variety of Salmonella serotypes recovered from turkeys has been tremendous. Specific data on the pathogenicity of all species are not available, but it must be assumed that many species are sufficiently pathogenic to cause a transient intestinal infection and, as a result, stimulate antibody production which may complicate the interpretation of serologic tests with *Salmonella pullorum* and *Salmonella typhimurium* antigens. No doubt many species are capable of causing a clinical infection in young turkey poults or young chickens.

Literature Review

The multiplicity of serotypes isolated from turkeys in the United States in 1959 is well illustrated in the reports on the incidence of Salmonella infections in animals published by the Agricultural Research Service, USDA, for Jan. 1 to June 30, 1959, and July 1 to Dec. 31, 1959. These reports indicate that at least 45 different serotypes of Salmonella were isolated from turkeys in this single year. No doubt this is an incomplete report, because many isolations are not typed or reported. In Texas alone, 20 different serotypes have been isolated from turkeys in the past 4 years.

According to recent research, many samples of poultry feed or feed ingredients were contaminated with Salmonella. These findings suggested a possible explanation for the ever-increasing number of species encountered in turkeys and for the infections of unexplained origin in turkey flocks.

That poultry feed might be contaminated with bacterial pathogens was suggested in 1943 by an investigator[4] who isolated *Erysipelothrix rhusiopathiae* from fish meal that was used in turkey feed.

In 1952, a Salmonella infection in an experimental animal colony was found to be due to contaminated feed.[5]

In 1955, Salmonella organisms were isolated from 3 of 203 samples of prepared poultry feed.[3]

The problem of Salmonella organisms in poultry feed did not receive much attention or cause much concern until 1958 and 1959 when 2 studies illustrating the importance of the problem were reported.[2,3]

In the 1958 study, 6 serotypes from 5 unopened bags of feed were isolated from 33 samples of a commercial turkey starter mash. Also, in 4 of 21 samples of meat scraps, Salmonella organisms were found. In this study, it was demonstrated[2] that paratyphoid which originated from the turkey feed caused a 34% mortality in poults.

In the 1959 study, involving 200 samples of animal and poultry by-products, 37 (18.5%) were contaminated with Salmonella organisms; 28 different serotypes were recovered from the 37 contaminated samples. There was a correlation between the serotypes recovered from the feed ingredients and those isolated from turkeys and chickens in the state.[3]

A Working Party of the Public Health Laboratory Service in England recently reported a study[1] of Salmonella contamination of animal feed stuffs and fertilizers. From 1,262 samples examined, 88 serotypes of Salmonella were isolated. In this study, Salmonella organisms were isolated from "unheated bone dust on floors and walls," "factory dust," and "cleaned sacks" which had been used for contaminated materials.

In Indiana, Salmonella organisms were found in

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only 3 of 157 samples of feed and feedstuffs examined.[6]

In Minnesota, 666 samples of feedstuffs were examined, and Salmonella organisms were found in 156 (23%). The 156 isolates included 41 serotypes. *S. typhimurium* was recovered 3 times, but *S. pullorum* and *Salmonella gallinarum* were not isolated. The materials examined originated in 22 states.[7]

Experimental Procedure

During the past year, work on this problem of feed contamination with Salmonella organisms has been extended at the Texas Station to include cottonseed and soybean oil meals. The samples for this study were obtained through the cooperation of the Texas Feed Control Service. Most of the sample materials originated from many places throughout the state; however, some had their origin in other states.

The samples were cultured for Salmonella organisms by placing 2 Gm. from each sample into each of 5 tubes containing tetrathionate broth, incubating at 37.5 C. for 18 to 24 hours, then plating on SS agar. Colonies typical in morphologic characteristics and appearance for Salmonella organisms were selected from the plates and identified. The Salmonella isolates were submitted to the Enteric Disease Laboratory, Communicable Disease Center, Chamblee, Ga., for serotyping.

Results

A total of 136 samples including 119 of cottonseed meal, 12 of soybean oil meal, and 5 that were mixtures of cottonseed and soybean oil meal were examined. Salmonella organisms were isolated from 7 samples (5.14%). The 7 isolates represented 6 serotypes as follows: *Salmonella derby*, *Salmonella worthington* (rough), *Salmonella infantis*, *Salmonella cubana*, *Salmonella schwarzengrund*, and *Salmonella simsbury* (rough z 27).

Summary

All workers who have examined feed and feed ingredients for Salmonella organisms have found a significant number contaminated with an increasing number of serotypes.

Although most of the studies have been directed toward materials of animal origin, this report indicates that vegetable materials may also be contaminated. Salmonella organisms comprising 6 serotypes were isolated from 7 of 136 samples of cottonseed and soybean oil meal. The role of feed in the dissemination of animal pathogens must be studied, and its importance in the epidemiology of animal diseases re-evaluated.

A method of processing and handling poultry feed and feed ingredients to assure freedom from Salmonella contamination must be developed before a satisfactory control program for paratyphoid infections in turkeys can be carried out.

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Oral Iron Requirements of Baby Pigs

According to a report by research workers at Purdue University, an optimal supplemental iron level for young pigs appears to be between 60 to 80 p.p.m. Duroc pigs weaned when 10 to 14 days old were fed a dried skim milk basal diet to which levels of 15 to 120 p.p.m. of iron were added. Levels of 15, 30, 40, or 50 p.p.m. of iron resulted in reduced growth rate; levels of 60 or more produced normal growth.—*Feedstuffs (Dec. 10, 1960): 11.*

Chemical Immobilization

of Wild Animals

WARREN D. THOMAS, D.V.M.

ONE OF the greatest problems facing the veterinarian in a zoo practice is that of restraint because the animals dealt with are, as a general rule, extremely nervous. Restraint places considerable stress on them and it is common for them to injure or even kill themselves when restrained.

In the past, restraint has involved the use of ropes, chutes, and squeeze cages. With the advent of tranquilizers, the task was made easier, in certain cases. But tranquilizers at best leave much to be desired. In my experience, there has been no middle ground with tranquilizers—they either work well or not at all. More often than not, the latter is the case.

Several years ago a new restraint instrument was made available—an air rifle* which fires an automatic injecting syringe. With this instrument, it is no longer necessary to manually restrain an animal in order to give it an injection. Injections can be given many feet away with minimum stress on the animal.

When succinylcholine chloride was first intended for restraint, goats were used as test animals to determine dosages (table 1). The first restraint problem confronting us involved a large herd of deer in a pen where bucks and does of various species were exhibited. The bucks had just come out of the "velvet" and were in "rut." During this period, they became extremely vicious; they had already killed 2 does during fights among themselves. Since the pen was so designed that it was nearly impossible to rope the deer, we elected to use the gun to capture the bucks so that we could saw off their antlers. Succinylcholine chloride** (20 mg./cc.) was selected because it probably would not seriously affect the central nervous system in a high-strung deer. Also its pharmacologic action on the peripheral nervous system was desirable.

The goats were given various dosages of the drug and, on the basis of these results, a paralytic dosage was determined. Later, the same technique was used to determine dosages for deer. During this process, 2 buck deer died because of overdoses. This was my first experience using this technique on wild animals; since then, the drug and the gun have been used successfully on a number of different kinds of animals (Table 1).

We have used this method not only in the zoo but also for capturing wild animals in their native habitats. Our success has far exceeded our expectations. Many man-hours have been saved and costs held to a minimum. For less than $5.00 worth of drugs we collected and brought back for display over $8,000.00 worth of live animals.

Technique of Capturing Wild Animals

When using the equipment to collect animals in the wild, it is impossible to know

Fig. 1—Antelope temporarily immobilized by succinylcholine chloride administered by a hypodermic syringe projectile. Effects of the drug dissipated after 18 minutes.

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*Cap-Chur Gun, Palmer Chemical & Equipment Co., Atlanta, Ga.

**Sucostrin, E. R. Squibb and Sons, New York, N.Y.

TABLE 1—Paralyzing Doses of Succinylchol Chloride and Duration of Paralysis in Wild Animals

Animal	Scientific name	Sex	No.	Age	Estimated weight (lb.)	Dose (mg.)	Av. latent period (min.)	Maximum latent period (min.)	Minimum latent period (min.)	Duration paralysis (min.)
Monkey spider	Ateles geoffroyi	F	1	Adult	5	5	4½	.....	.....	20
Monkey spider	Ateles geoffroyi	F	1	Adult	5	10	50 sec.	.....	.....	30
Monkey spider	Ateles geoffroyi	F	1	Adult	5	20	½	.....	.....	45
Lion African	Panthera leo	F	1	Adult	275	60	6	.....	.....	11
Lion African	Panthera leo	F	1	Adult	275	120	2½	.....	.....	60
Goat domestic	Capra prisca	M	1	Adult	110	70	6½	.....	.....	60
Goat	Capra									
Goat domestic	prisca Capra	M	1	Adult	110	40	9	.....	.....	30
domestic	prisca	M	1	Adult	110	20	14	.....	.....	15
Goat domestic	Capra prisca	F	3	Adult	50-80	20	11	14	9	15
Goat domestic	Capra prisca	F	3	Adult	60	15	11	11	11	17
Goat (Tahr) Himalayan	Hemitragus jamiahious	M	2	Adult	165	17½	6	.....	.....	21½
Goat (Tahr) Himalayan	Hemitragus jemiahious	F	2	Adult	115	15	6	.....	.....	20
Sheep Barbary	Ammotragus lervia	M	2	Adult	200	20	15	17	12	7
Antelope pronghorn	Antelope Capra Americana	M	2	1 year	50	5	8	10	6	15
Deer fallow	Dama dama	M	7	Adult	135	10	11½	17	7	13
Deer axis	Axis axis	M	1	Adult	120	7	10	.....	.....	17
Deer axis	Axis axis	F	1	Adult	120	7	8	.....	.....	19
Deer sika	Cervus nippon	M	2	Adult	170	7	7	7	7	14
Deer sika	Cervus nippon	F	4	Adult	130	7	7	7	7	14
Deer barasingha	Cervus dubauceli	M	5	Adult	450	13	9½	11	7	15-7/10
Deer barasingha	Cervus dubauceli	M	1	Adult	375	13	8½	.....	.....	20
Deer barasingha	Cervus dubauceli	F	16	Adult	(170-360) Av. 227	6-10 7.2	8	12½	5	(10-30) 17½
Deer barasingha	Cervus dubauceli	M	1	Adult	Emaciated 400	7	9½	.....	.....	20
Deer barasingha	Cervus dubauceli	M	1	Adult	Emaciated 325	6	9	.....	.....	30
Wapiti (elk)	Cervus dubauceli	M	1	Adult	1,100	23	6	6	6	18
Wapiti (elk)	Cervus canadinsis	F	4	Adult	550	15	5-3/10	7½	3½	(18-25) 2½
Wapiti (elk)	Cervus canadinsis	M	1	Adult	450	15	5-3/10	7½	3½	21½
Deer red	Cervus elaphus	M	5	Adult	260	15	7½	9½	(16-23) 6½	(14-18) 16
Bison	Bison bison	F	1	Adult	700	25	7	7	7	10
Antelope (eland)	Taurotragus oryx	F	1	Adult	250	6	9	.....	.....	14

what size animals are going to be available for capture. For this reason, we take an oxygen tank hooked up to a rebreather system so oxygen can be administered through an intratracheal tube. Oxygen is given in case of an overdose of succinylcholine chloride, which causes respiratory paralysis. While still paralyzed, all animals are also given prednisolone and antibiotics according to body weight. Amphetamine is administered when deemed necessary. Before the animals are allowed to completely recover, tranquilizers are injected.

There is considerable species difference in tolerance to the drug, as well as wide individual difference within the species itself. Although succinylcholine chloride is an excellent drug when used carefully, it is lethal when used imprudently. We normally prefer to administer just enough to paralyze the animal's legs; however, this paralytic effect is difficult to achieve because a small miscalculation in dosage produces a considerable difference in response. Primates and goats have a great tolerance for the drug but generally deer and cattle have a low tolerance (Table 1).

In using this capture equipment, only rarely has a syringe misfired or not injected the full quantity of drug. Because it is powered by carbon dioxide, the gun requires some experience to use properly because there is a wide variation in accuracy and range. For example, on a cold day with temperatures of 20 to 40 F., accurate shots of over 30 yards are difficult unless the gun is prewarmed. On a hot day with temperatures between 80 and 100 F., accurate shots of up to 50 yards are possible. Normally, we use the heavy muscles of the hip or neck of the animal as a target.

In large field pens where the operator of the gun can get at least 20 yards away from the animals, the rifle is the better instrument to use. Under 20 yards, the pistol is better, because lower muzzle velocity results in a softer impact on the animal and consequently less contusion.

Summary

This report deals with the use of a paralytic agent, succinylcholine chloride, in zoos and in the field, for immobilizing specimens for collection purposes, examination, and treatment. The drug is administered by a hypodermic syringe projectile fired from a carbon dioxide-powered rifle or pistol. Dosages and time of reaction for several wild animals of different weights are given.

Achlorhydria in Dogs

The most common clinical findings associated with achlorhydria in dogs is after-feeding vomiting which does not respond to normal antiemetic therapy. Vomiting associated with achlorhydria usually starts shortly after weaning and disappears by 18 months of age. Diagnosis may be made on the basis of clinical findings combined with the resolution of signs when hydrochloric acid (HCl) therapy is instituted.

As therapy, HCl or glutamic acid hydrochloride may be administered. HCl may be placed in the water dish of the patient at the rate of 15 drops per pint of water. Glutamic acid hydrochloride may be given in 0.3-Gm. capsules, 1 capsule with each meal. Persistent diarrhea accompanying achlorhydria may be treated with bismuth subcarbonate, with or without paregoric. Concurrent anemia may be corrected by large doses of any commercial anti-anemia preparation.—*Canad. Vet. J., 1, (Sept., 1960): 396.*

Participation of Veterinary Colleges in

Medical Research Programs

W. T. S. THORP, D.V.M.

THE PAST 2 decades, particularly since World War II, have been enormously productive, when the end products of research are considered. The procedures and agents which can be used against disease—unknown in 1940, but available now—make an impressive array.

The whole research effort in this country has undergone many changes. There has been a progressive breakdown of the walls between the physical, biological, and medical sciences. The recent advances in physics have been main factors in welding these sciences together. This shift toward closer cooperation in the sciences is an important one, and may prove to be as significant as the more direct contributions which have been made in the past few decades.

The relationship between American colleges and universities and the federal government has been a topic of discussion for some time. For years there has been an office of experiment station program to support research in our Land-Grant Institutions. The expanding needs and diversity of research which have developed in the scientific world have brought about many revisions in ideas regarding the support of higher education and research. For a number of years, but more particularly since 1947, there has been a relationship between the granting agencies of the federal government and the colleges of medicine, dentistry, veterinary medicine, and others in this country.

It is a fact that education and research cannot be separated. This is also true in the medical sciences—that research and education are inevitably wedded. Man, in his efforts to control disease and pestilence over the centuries, learned that without knowledge he was without hope of discovering a means to prevent disease—thus, the history of all medicine. Efforts directed toward improving animal health serve human health—the 2 are inseparable. One cannot be sure whether most laymen recognize this fact or not.

The veterinary profession has primarily concerned itself with the infectious diseases of animals, including those transmissible to man. As established medical professions, scientifically and technically, medicine and veterinary medicine do not differ. We, as veterinarians, have been remiss in not conveying to the public the contributions our profession has made in the general field of medicine.

It may be that we in veterinary medicine, in our effort to prevent economic losses in the animal industry, have lost sight of the contributions and the part we can play in the whole medical research effort. We have in the past "tied our star," so to speak, to the economics of agriculture. It is understood that we have this obligation to agriculture, but have we pursued this goal in our research program so intently that we have failed to recognize the contributions and the place of veterinary medicine in the total medical research effort?

The United States Department of Agriculture, through its Office of Experiment Stations and by contracts and agreements, has for many years supported much of our animal disease research. The past decade has witnessed considerable support of our veterinary institutions from other federal agencies, specifically the U.S. Public Health Service, National Institutes of Health grant program, Atomic Energy Commission, Department of Defense, more recently, the National Science Foundation, and others.

If the veterinary institutions and the scientific personnel in the veterinary pro-

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fession are to avail themselves of the opportunity to participate in medical research programs, many of the veterinary schools and colleges are going to have to put forth more effort to compete for funds appropriated for the various medical research and training programs. These funds are available for a project if it is proposed on a proper and sound basis.

Today, there are approximately 22,000 veterinarians in the United States; this is not enough. The present 18 veterinary colleges cannot supply the graduate veterinarians needed by the Department of Agriculture, U.S. Public Health Service, medical institutions, and others, to say nothing of the demand for practitioners. Based on a population of 230,000,000 by 1975, we will need approximately 35,000 veterinarians, or 1,200 graduates annually, to meet the estimated total needed 15 years from now. This will mean expansion of the present colleges of veterinary medicine, and perhaps the establishment of 1 or 2 new ones. In any establishment of a veterinary college or the expansion of our present institutions, we would be negligent and even devoid of foresight if we did not make plans to include facilities for medical research in such expansion.

The Health Research Facilities Act, established in 1956, which has currently been spending $30,000,000 a year on a fund-matching basis for health-related research facilities, had, through February of 1960, awarded $3,125,723 to veterinary colleges and departments of veterinary science, for the construction of health-related research facilities. The total dollar figure for NIH research grants in our veterinary institutions for the year 1959 was $1,238,508.

What is the effect of federal support of medical research upon nonfederal sources of support? State government support has doubled to an estimated $20 million in 1960. Industry has increased its support from $35 million in 1947 to $215 million in 1960, contributing 30 per cent of the total support, at present. Private philanthropic support has increased from $15 million in 1947 to $81 million in 1960. The conclusion is drawn that expansion of the federal program for the support of medical research has acted as a stimulus rather than a deterrent to appropriations.

A committee of consultants on medical research, studying federal support of medical research, made a report to the subcommittee for the Departments of Labor and Health, Education, and Welfare at the request of the appropriations committee. This is commonly known as the Jones Report, not to be confused with the Bane Jones Report of the previous year. Certain recommendations and conclusions were drawn from this recent study, which give some indication regarding the future federal support of medical research. In 1957, including not only the Public Health Service, but the Department of Defense, Atomic Energy Commission, and Veterans Administration, a total of $186 million was spent on medical research. The estimate for 1959 is $290 million; for 1960, $379 million. In 1957, 74 per cent of this was from the U.S. Public Health Service of the Department of Health, Education, and Welfare; in 1958, 79 per cent; and in 1959, 82 per cent. It is estimated that it will be 82 per cent for 1960. The research grant program of the NIH has increased from $3.4 million in 1947 to $202.9 million in 1960.

In the Jones Report, this general conclusion was made: "Funds appropriated by the Congress for the support of medical research, although substantial, are still not sufficient to assure the full utilization of the Nation's potential for an attack on the dreaded diseases, and the present level of support is far from adequate to permit the great advances essential for the future." In the report it was also recommended that, "The federal government should supplement private, industrial and state funds as may be necessary to support medical research on the scale required to carry out a determined attack on the major health problems." The magnitude of federal support should be neither limited by, nor paced by, the rate of increase of nonfederal sources of support.

The Congress has entrusted to the National Institutes of Health the chief responsibility for the disbursement of funds for medical research. A successful system of review and approval of applications of all types has been worked out. This system relies upon close supervision by the scientific community, and has operated in such a manner as to win the confidence of the entire medical research community. This program has flexibility and has been able to provide far more adaptability in meeting the various problems of such a large granting agency. It continually has taken a most

realistic view in the operation of its grant program.

Probably one of the most significant recommendations made by the Jones Committee was that the Public Health Service should be permitted by law, upon recommendation of the appropriate Council of the National Institutes of Health, to make institutional grants to public or nonprofit universities, hospitals, laboratories, research institutes, and other institutions, for the general support of their medical research and research training programs. An increase has been recommended for the training grant programs. Furthermore, it has been recommended that funds be made available to institutions so that additional opportunities for stable academic careers in research may be provided and thereby permit a large number of investigators to make their maximum contributions to the research effort.

The fact that physicians and dentists constitute less than half of the professional personnel engaged in research, indicates that the veterinarian or the veterinarian with the Ph.D. will or should play an important role in the total medical research effort. The present shortage of physicians and dentists is not a limiting factor on the expansion of our total research effort.

The colleges and departments of veterinary medicine are in a position to play an important role in the medical research effort of the entire country. The veterinary colleges will, however, need to provide facilities for research and increase their graduate programs to provide training beyond that required to obtain the D.V.M. degree. The expansion of research facilities and the support for research in all the medical sciences will provide opportunities for veterinarians with special training to make definite contributions to the advancement of the medical sciences generally.

The efforts of the veterinary profession to control diseases in animals or to improve animal health, also serve to improve human health. Problems of animals and human health are scientifically and technically no different.

The support that veterinary medicine is receiving and will receive from the federal agencies, philanthropies, and industry will undoubtedly increase during the next decade. Veterinary institutions and, in fact, the veterinary profession concerned in any way with research should be in a position to assume the responsibilities and the role which veterinary medicine can play in our medical research effort.

Telangiectasis—A Hereditary Condition?

Hereditary hemorrhagic telangiectasis (Rendu-Osler-Weber disease) is a disorder in man in which tiny arteriovenous aneurysms may be present in virtually every visceral organ and on every body surface. It occurs because there is lack of elastic tissue in the endothelial walls interposed between arteries and veins of the vascular sinuses. These endothelial structures, when injured, bleed severely before the blood clots.

Although telangiectasis may affect any body structure, it is the nose that bleeds most commonly in man and epistaxis becomes the bane of the patient's life. The disorder may be passed as a simple dominant trait from either parent to both male and female children. New telangiectases appear as the person grows older.—*J.Am.M.A., 174, (Dec. 10, 1960): 1972.*

Probably it is not known whether telangiectasis as it occurs in cattle is hereditary or due to some other cause. According to the 1960 "Summary of Activities' Report" of the USDA Meat Inspection Division, telangiectasis was the cause of condemnation of 370,351 cattle livers and 1,641 calf livers.—ED. NOTE.

Veterinarian in Military Medical Research

R. P. MASON, M.D.

THE DOCTOR of veterinary medicine has made significant contributions to military medical research. Since horses and mules played an important role in military operations at one time, it is not surprising that the earliest contributions were directed toward the maintenance of good health of these animals. The veterinary officer has also had an interest in and responsibility for food inspection since the earliest days of the Veterinary Corps. These interests and responsibilities in equine health and in food inspection inevitably influenced the research efforts of early investigators. However, the veterinarian interested in research eventually was drawn to the study of zoonoses and has contributed much to this field. In the Army, for example, the veterinary officers were early contributors to the study of viral encephalitides, especially those with high incidence and mortality in horses.

There are many characteristics and capabilities that an individual must possess in order to pursue a successful career in research, regardless of his background academic training. These include a great personal drive to pursue such a career and a fundamental knowledge of the various sciences involved. In the case of medical research, whether civilian or military, it is essential that the investigator have a broad knowledge of biology. He may have a specialized knowledge and ability in any of the several biological sciences, but he is rather inadequate without a broad general knowledge of biology.

The doctor of veterinary medicine, like the doctor of medicine, through-out his undergraduate and graduate education acquires a great deal of knowledge and experience in fundamental biology. Since the veterinary schools and the medical schools have as their principal goal the development of clinical practitioners, the greatest teaching emphasis is directed to those aspects of biology which are applicable to clinical medicine. Nevertheless, the sound basic foundation in biology can be exploited for research by the graduate who is interested in research. It is not necessary for a graduate of medicine or of veterinary medicine to acquire additional degrees in such sciences as physiology, bacteriology, or immunology to be qualified for a career in research. It is necessary for him to work in a research environment where he is associated with scientists trained and experienced in the various biological sciences. It is the knowledge, the experience, and the drive which are important, not the academic degree held. Medical research today is, for the most part, a team effort involving individuals with detailed knowledge in many biological sciences. The background of clinical knowledge and experience provides the doctor of medicine and the doctor of veterinary medicine an opportunity for research in an area which, for the most part, is closed to biologists who have not studied medicine or veterinary medicine.

The doctor of veterinary medicine has as many opportunities in medical research as does any other well-trained biologist. These opportunities are expanding rather than contracting, and opportunities for a career in medical research are greater for the doctors of veterinary medicine in the military service than they are for those in civilian medical research.

In the military forces, the greatest single factor contributing to the loss of effective manpower for training, combat, or staff and clerical work is infectious disease. A major part of our research effort, therefore, is directed toward the acquisition of

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knowledge which will enable us to eradicate or control infectious diseases. There are many other areas of medical research which are of special interest to the Army Medical Service and in which Veterinary Corps officers can play a major role. These include the study of traumatic surgery and shock, radiation injury and illness, neuropsychiatry, and nutrition.

Medical Research and Development Command

To understand fully the opportunities of any person in medical research in the Army, the U.S. Army Medical Research and Development Command should be discussed. This organization is commanded by a general officer who is a doctor of medicine. He has under his command a group of officers of the Army Medical Service consisting of representatives of the Medical Corps, the Veterinary Corps, the Dental Corps, the Medical Service Corps, and the Army Nurse Corps. All of these individuals are actively engaged in one phase or another of the over-all Army medical research program. They are stationed in 7 medical research laboratories within the United States and 6 research laboratories outside the United States. In addition, there are from time to time field teams placed outside the United States for the purpose of pursuing relatively short-term research projects. The Veterinary Corps officer can and does participate in any of these projects in the various laboratories, depending upon his interest and capabilities.

Within the Army Medical Service, the Veterinary Corps is directed by a general officer who cooperates with the Commanding General of the Army Medical Research and Development Command. He makes available Veterinary Corps officers who possess interest and talent in the various research fields of interest and importance. This collaboration has been extremely successful through the years, and the present chief of the Veterinary Corps and his immediate predecessor have been most helpful and understanding.

The veterinary officer may be utilized in any project in which he has the necessary specialized talent and interest. He is utilized either as the sole or principal investigator, as a member of a team effort, or as a consultant, again depending upon his demonstrated or potential ability and his interest. The major contributions of the Veterinary Corps officer historically have been concerned with infectious diseases, in the fields of bacteriology, virology, immunology, pathology, and parasitology. This participation by veterinary officers is continuing.

New Fields of Medical Research

There are newer fields of medical research, however, in which the veterinary officer plays a role of increasing importance. One of these important areas is nuclear medicine (radiobiology). The effects of nuclear radiation on food and food-producing animals are of extreme importance to the military forces as well as the civilian population. The possibility of epizootics, as an indirect result of radiation, and the prevention and control of such epizootics are also important. Several officers of the Veterinary Corps have been afforded the opportunity for graduate training in the field of radiobiology, and most of these men are now involved in research utilizing their specialized knowledge. For example, at the Walter Reed Army Institute of Research, veterinary officers work as team members on projects to develop a chemical method for protection against radiation; they investigate equipment for field use to detect radiocontamination of food and methods for decontamination of food products; and they conduct studies on effects of radiation when combined with various infectious processes. Some veterinary officers have developed an interest in working with nuclear reactors. Since we are in the process of constructing a 50-k.w. reactor at the Walter Reed Army Institute of Research, an opportunity for a veterinarian will soon be available in work involving *gamma* rays, neutrons, and isotopes with short half-lives.

Research with germ-free animals offers another relatively new field for officers of the Veterinary Corps at the Walter Reed Army Institute of Research. We have a colony of germ-free mice and rats which provide opportunities for almost unlimited basic research in nutrition, in wound healing, in the effects of radiation, in immunology, infection, and almost any biological phenomenon which has been traditionally

studied in the conventional laboratory animal.

An opportunity for the doctor of veterinary medicine which lies in the field of research but is much less glamorous than those I have mentioned involves the proper care and management of laboratory animals. A great deal of personal pride can and should be derived by the veterinary officer who is responsible for providing healthy animals to the various laboratories of a research institution. The prevention of disease in laboratory animals is a form of clinical veterinary medicine, and there is opportunity for research in this field just as there is opportunity for clinical research in human medicine. The laboratory animal is an integral and an important part of medical research, and the healthier these animals are the more reliable the results of medical research.

Research and Education

A field which is closely interwoven with and should never be separated from research is education. We tend to combine words in the military which seem to go well together. We have "research and development," "education and training," "research and engineering," but nowhere to my knowledge do we have the combination of "research and education." This combination is so important, at least in biology, that the 2 entities cannot be separated profitably. In the Army Medical Service and especially at the Walter Reed Army Institute of Research the opportunity exists to properly blend research and education. Although the principal mission of the Institute is medical research, an important secondary mission is graduate education; and the Veterinary Corps officers play an important role in both parts of this program. The Army Veterinary School is an integral part of the Walter Reed Army Institute of Research and has been since it was moved from Chicago to Washington and since it became a part of the Medical Department Professional Service Schools in 1923.

At present, there are 3 formal courses available specifically for veterinary officers at Walter Reed Army Institute of Research. These courses are "Examination for Radioactive Contamination of Foods," "Veterinary Aspects of Nuclear Medicine," and "Veterinary Laboratory Procedures." In addition, we have recently established a residency program in laboratory animal medicine to provide the Army Medical Service with skilled veterinary specialists who will be equipped to provide veterinary support and to participate in research projects utilizing laboratory animals. This residency program is based on 2 years of supervised training, experience, and study and has been approved by the Council on Education of the AVMA and by the American Board of Laboratory Animal Medicine. During the first year, the residents receive didactic review of the basic sciences, stressing species differences and advancing the training received in the schools of veterinary medicine. They also receive instruction concerning naturally occurring infectious and noninfectious disease processes of laboratory animals, with particular emphasis on microbiology, parasitology, clinical pathology, and histopathology. During the first year, they see and assist in the operation and management of animal colonies, with special emphasis on production, housing, feeding, and use of special equipment and procedures.

In the second year, the participants in this residency program take part in research projects in such fields as experimental surgery, resuscitation, infectious diseases, immunology, or radiobiology. They work with individuals involved in all functions necessary to a research colony, and select a research project of either a laboratory or clinical type which is related to laboratory animal medicine and is of importance to the over-all military medical research program.

There is another area in which doctors of veterinary medicine with training and experience in laboratory animal medicine can be highly useful in medical research laboratories. They may serve as consultants regarding housing and care of laboratory animals. A Veterinary Corps officer who is well-trained in laboratory animal medicine, including a sound background knowledge in the basic biological sciences and in research, can be of inestimable value in advising on the management of animals both before and during an experiment.

In summary, the Veterinary Corps officer in Army medical research has played and is playing an important role, and the opportunity exists for him to play an even more important role in the future.

Editorial

Can the Need for Veterinary Medical Education Be Met by 1975?

Guest Editorial

Revolutionary adjustments to changing circumstances have been frequent in the eventful history of veterinary medicine as an art and as a learned profession.[1-5] Famine, war, and plagues have made deep imprints on the pattern of evolution and development of the profession. Ignorance, superstition, and economic interests have buffeted the very existence of animal medicine through nearly 40 centuries of recorded history.

The industrial revolution in North America, beginning in the late 19th century, saw machines largely supplant the horse as sources of motive power and transport. Dire predictions that the veterinarian would become extinct with the decline of horse power obviously failed to materialize. Rather, survival and vigorous development ensued because the American veterinarian had already proved his capabilities to deal effectively with other important problems, e.g., eradication of contagious pleuropneumonia and Texas fever and supervision of clean milk and meat production. Furthermore, he had become an indispensable member of society.[1]

The transition from chiefly horse practice to other important endeavors, however, did not come without serious dislocations and great changes. The period from 1920 to the late 1930's saw enrollment in schools of veterinary medicine decline greatly. The adverse impact of these numerical shortages in education for the profession over almost 2 decades is evident today in all areas of veterinary medical obligation.

Recognition of the expanding role of veterinary medicine and of its many challenges have greatly increased interest in veterinary medical education, especially since World War II. Unfortunately, only a small proportion of applicants to our colleges could be accepted during these years. Nevertheless, expansion of enrollment in the 10 existing schools and establishment of 8 new schools in the United States and the 2 Canadian schools during the period 1944-1959 led to a peak acceptance of 1,095 first-year students in 1960. During the period from 1958 to 1960, the ratio of acceptances to applicants to our veterinary colleges rose substantially over that of the years 1945 to 1958. This development, coming in the face of small numbers of youths of college age and the increasing competition for students from the physical sciences and other professions, resulted in a drop in quality of the students who were enrolled.

Increasing Dimensions of Veterinary Medicine

The period from 1945 to 1960 saw a phenomenal and unprecedented increase in the need and demand for veterinary medical services, both established and new. The enlarging horizons of veterinary medical services brought new and rapidly expanding areas of endeavor and specialization, e.g., in public health, in space medicine and radiation effect research, and in laboratory and zoo animal medicine. Recognition of the urgent need for veterinarians in general medical research has led 2 schools of medicine to offer specialized, postgraduate training in laboratory animal medicine for veterinarians.

Thus, critical evaluation of present trends and discerning thought and planning for the future are paramount if the obligations

and responsibilities of veterinary medicine are to be fulfilled.

Estimates of Needs for Veterinarians Through 1975

The increase in the population of North America by 2/7 (almost 29%) since 1945 has been accompanied by a rise in numbers of veterinarians to achieve, in 1958, a proportion of about 11.6 doctors of veterinary medicine per 100,000 human population.* The figure was 8.5 in 1946. While the relative number of veterinarians has increased, the demand for veterinary medical services has outstripped this expansion 2 to 4 times. The harmful results of more and greater voids in veterinary medical services are starkly evident today.

Too, there is lacking a realistic awareness, both by the public and in the profession, of what the mounting shortage of increasingly better educated veterinarians portends. The scope and acuity of the problem can be pictured as follows:

1) Authorities conservatively predict an increase of 1/3 in the population during the 15 years through 1975! Only to "keep even" without resolving immediate shortages, would require that 1/3 more (1/3 of the 21,000 extant, or 7,000) veterinarians be educated.

2) The average span of the veterinarian's activity in his profession is 30 to 35 years. Thus, about 1/2 of the veterinarians (1/2 of 21,000 or 10,500) now active may be expected to retire or die by 1975.

3) Expansion of the needs for and scope of veterinary medical services during the next 15 years, if comparable to the 50% increase which occurred from 1945 to 1960, would demand education of an additional 10,500 veterinarians by 1975, *i.e.*, ½ of 21,000, for a total need of 27,500.

4) Education and training of 30,000 new veterinarians** before 1976 will require great expansion of means and facilities. If the recent rate (about 900 per year) of graduating veterinarians is maintained, the total from the 15 years ahead would be 13,500 or only 45% of the estimated need.

Meeting these needs will demand prompt realistic planning and early forthright action. Proposed solutions include:

1) Organizing the colleges of veterinary medicine on a 48-week per year, trimester basis, thus permitting enrollment of 4 entering classes every 3 years and potentiating the output of veterinarians by 1/3. This increment of 4,500 would bring the total number to 18,000 by 1976; *i.e.*, 60% of the estimated need.

2) Organizing the college programs on a 48-weeks per year quarter system would allow enrollment of 5 entering classes every 4 years and increase the number of graduates by 1/4 (*i.e.*, by 3,300) in order to educate 16,800 or about 56% of the projected needs.

3) Doubling the enrollments of the schools on the current semester and quarter basis could bring the output of graduates to about 27,000 or 90% of the projected demand.

4) Overcoming the deficiencies in numbers would require, in addition to doubling the enrollments in the 19 schools now in full operation, the establishment of at least 5 new schools of a size equal to that at Purdue University (50 in each entering class), which accepted its first class in 1959. The fruition of these projections would not, however, overcome the effects of the past and present dearth of veterinarians. The excess of positions or places in practice or other endeavors available to each of today's graduating veterinarians appears to be 3 to 4 times the number available.

5) Each of the 3 suggested alternatives would present formidable yet obviously not insurmountable obstacles. All would require a substantial increase of superior senior as well as strong junior faculty to accommodate the larger load of students. A threshold teaching load could be expected of each instructor for 2 or 3 successive terms but not indefinitely without regular respite. There is now only a limited core of able and experienced faculty members for each of the colleges. Additional facilities, resulting from doubling and improving existing physical plants, would not resolve the associated problem of having adequate clinical material for the enlarged classes. Some of the clinical faculty agree that, (*a*) more efficient use of available cases and (*b*) "manufacturing" clinical material would be feasible in part, yet organization of outlying teaching clinics, both resident and ambulatory, would be required.

Strengthening the professional curriculum demands stimulation and discrimina-

*To base veterinary medical needs on human population figures is warranted by the fact that professional veterinary services are a prime necessity for the well-being of man, to afford a plentiful supply of animal foods, to protect the health of pets, and to control the zoonoses.

**It has been estimated (Report of Congressional Subcommittee, 1959) that in order to meet the needs of an increase in activities in the public health field in North America by 1980, 1.75 veterinarians per 10,000 population (i.e., at total of 47,250) would be desirable.

tion which result from close association of the faculty with vigorous, on-going research and graduate programs. It would be folly, in an era which demands ever-increasing scientific and professional specialization, to sacrifice support for these programs to satisfy the need for educating twice as many students for the professional degree. There is becoming more evident also the urgency of continuing, self-education of the veterinarian beyond the D.V.M. degree. This can best be accomplished by extension-type guidance and assistance from and through the faculties and programs of our veterinary medical colleges.

Candor must recognize that unpredictable factors and circumstances may modify demands and needs for veterinary medical services* through the next 15 years. Realism, nevertheless requires "a girding of the loins" toward multiplying several fold the over-all veterinary medical effort. No one familiar with the past and present is unaware of the expanding demands and diverse challenges that prevail and that certainly lie ahead for veterinary medicine. Neither would anyone be so naive as to believe that the projected goals can be attained without sustained, organized, and perhaps heroic effort. Success toward the goal demands concerted action by the profession as a whole, not by the educators and scientists alone. Finally, it is inescapable that veterinary medicine's passing objectives can be accomplished only by arousing an abiding climate of enlightened self-interest among substantial segments of the public—those segments that benefit most directly from the veterinarian's talents, skills, and efforts.—*C. A. Brandly, D.V.M., M.S., Dean, College of Veterinary Medicine, University of Illinois, Urbana.*

*Changes in animal production methods including reduction in numbers and increase in size of production units, improved transportation and educational facilities, and augmented utilization of subprofessional personnel are among the factors that may influence the total need for veterinary medical effort.

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[4]Report of Subcommittee on Reorganization and International Organization, United States Senate Committee on Government Operations. Health in the Americas and the Pan American Health Organization. U.S. Govt. Print. Off., Washington, D.C. (1960): 105.

[5]Smithcors, J. F.: Evolution of the Veterinary Art. A Narrative Account to 1850. Veterinary Medicine Publishing Company, Kansas City, Mo. (1957): 408.

A Brief on Vesicular Diseases

The term, "vesicular diseases," usually includes vesicular exanthema of swine (VE), vesicular stomatitis (VS), and foot-and-mouth disease (FMD). These diseases differ in various ways, but they are practically indistinguishable clinically. In all these diseases, vesicles of a few millimeters to many centimeters in diameter occur in the mouth, the coronary band of the foot, and occasionally at other locations such as the muzzle or snout, the dew claws, the pudendum, and the teats.

Because of necrosis, the affected epithelium in the vesicular diseases ruptures easily, leaving shallow, granular, hyperemic erosions which generally tend to heal within a few weeks unless bacterial infection intervenes. Secondary complications are common in the feet or on the udder, especially in the case of foot-and-mouth disease.—*Canad. Vet. J., 1, (Oct., 1960): 427.*

Antibiotic Treatment in Vibriosis

Vibriosis, an abortion disease caused by the bacterium *Vibrio fetus*, occurred in 2 large bands of experimental ewes. Experiments were designed to determine the effect of chlortetracycline, penicillin-streptomycin, and a combination of both antibiotics in reducing losses due to this disease. The 2-, 3-, and 4-year-old ewes were allotted at random, within line of breeding and age, to a control group and various treatment groups. Approximately 80 mg. of chlortetracycline per head per day (given in grain pellets) increased the percentage of ewes having at least 1 live lamb to 8 to 10% above that of the untreated controls. Two 4-cc. intramuscular injections of penicillin-streptomycin, given on consecutive days, increased the percentage of ewes having at least 1 live lamb by 13 to 17% as compared to the untreated controls. When the injected antibiotics were given in combination with feeding 80 mg. of chlortetracycline per head daily, the percentage of ewes having as least 1 live normal lamb was increased 11 to 15 per cent above the untreated controls but was not increased above that in ewes given only penicillin-streptomycin. The response of ewes to treatments involving penicillin-streptomycin differed significantly from that of the untreated controls. The differences in response to antibiotic treatments among the treated ewes were not significant. The effectiveness of penicillin-streptomycin injections, independent of the chlortetracycline in the feed, may have been conditioned by an immunity developed after infection, the prevention of subsequent infection as a result of bunk feeding, or other undetermined factors.—[*C. V. Hulet, S. K. Ercanbrack, D. A. Price, R. D. Humphrey, F. W. Frank, and W. A. Meinershagen: Effects of Certain Antibiotics in the Treatment of Vibriosis in Sheep. Am. J. Vet. Res., 21, (May, 1960): 441-444.*]

Neuropathology of Canine Toxoplasmosis

The central nervous systems (CNS) of 63 dogs with confirmed toxoplasmosis were studied; 43 were experimentally infected and 20 had naturally occurring cases. It was attempted to (1) describe and classify the brain lesions and determine their type and nature in different stages of the disease; (2) investigate the susceptibility of dogs of various ages to cerebral toxoplasmosis; and (3) determine the distribution of the lesions in various areas of the brain and spinal cord. Dogs of various ages were used in the experimental work, and various routes of inoculation were successfully employed. There was no difference between the lesions of the CNS found in dogs with experimental or natural infections. Forty-seven (74%) of the 63 dogs had lesions in the CNS attributable to toxoplasmosis. They were characterized by vascular damage and focal necrosis in acute cases and by glial nodules and repair in chronic cases. Extracellular organisms were found in relation to necrotic foci in dogs having acute infections, and intracellular *Toxoplasma gondii* and cysts were found in dogs with chronic cases.

Nineteen dogs had latent infections and 10 pups were classified as having congenital toxoplasmosis. Ruptured cysts and hypergic response were characteristics of reactivated latent toxoplamosis. Lesions were found in all parts of the CNS and no predilection site was noticed, except that cysts in dogs with chronic toxoplasmosis appeared more frequently in the cerebral cortex than elsewhere. Young dogs were more susceptible and congenital infections resulted in the most severe and extensive lesions. An original observation was the occurrence of congenital toxoplasmosis in 2 consecutive litters whelped by the same bitch. It was concluded that the incidence of brain and cord lesions in canine toxoplasmosis is high and that microscopic study of the CNS is of great importance in the diagnosis of toxoplasmosis in dogs.—[*A. Koestner and C. R. Cole: Neuropathology of Canine Toxoplasmosis. Am. J. Vet. Res., 21, (Sept., 1960): 831-844.*]

Parasites in Zoo Animals

Sugar flotations were made of fecal specimens from 391 captive animals at the Lincoln Park Zoological Gardens and the Indian Boundary Zoo in Chicago. Upon examination of the flotations and of necropsied animals, the incidence of infection was found to be 13 per cent (52 animals). Ascarids were the most commonly observed parasites. Treatment involved the use of piperazine adipate, a coated hexylresorcinol preparation, and dithiazanine iodide. The efficacy of the drugs in eliminating ova of helminths from the feces was observed to be 72 per cent for piperazine adipate, 66 per cent for dithiazanine iodide, and inconclusive for coated hexylresorcinol. The latter preparation was discontinued because of side effects of vomition and diarrhea in cats. Side effects noticed with dithiazanine iodide were nausea and diarrhea.—[*B. J. Jaskoski and W. Krzeminski: Incidence and Treatment of Parasites in a Zoological Garden. Am. J. Vet. Res., 21, (July, 1960): 631-635.*]

Blood Enzymes in White Muscle Disease

In spontaneous white muscle disease in lambs, and in muscular dystrophy induced by feeding cod liver oil to lambs, the serum lactic dehydrogenase increased greatly and, in severe cases, the serum alkaline phosphatase decreased to half its normal value. No change was found in acid phosphatase. True cholinesterase was absent in serum from both diseased and normal lambs.

A highly significant linear correlation exists between serum lactic dehydrogenase and glutamic-oxalacetic transaminase in white muscle disease. No simple relationship could be demonstrated between serum alkaline phosphatase and glutamic-oxalacetic transaminase, since the alkaline phosphatase level in white muscle disease was reduced only in severely affected lambs with very high transaminase levels.

Using normal lambs, 7 and 35 days of age, no effect of age, sex, or breed on serum lactic dehydrogenase or glutamic-oxalacetic transaminase was found. With respect to serum glutamic-oxalacetic transaminase, it was found that twin lambs were no more similar than randomly selected lambs.—[*C. Blincoe and D. W. Marble: Blood Enzyme Interrelationships in White Muscle Disease. Am. J. Vet. Res., 21, (Sept., 1960): 866-869.*]

Staphylococcic Antitoxins in Dairy Cattle

A review of the literature reveals that staphylococcic antitoxins are found in the blood of a large percentage of dairy cattle and that the incidence of *alpha* antitoxin is greater than *beta* antitoxin. The review of data also reveals that the antitoxin titers tend to increase with the age of the animals, they are higher in cows with staphylococci-infected udders, and they tend to increase with the number of infected quarters. In addition, the *alpha* antitoxin occurs in the whey at a much lower level than in the blood. The whey titers are generally higher in the infected quarters, and the concentration appears to be correlated with an increase in the pH of the milk. The *alpha* and *beta* antitoxin titers in the colostrum may also be higher than in the blood, but they decrease rapidly after calving.

There is evidence that toxoids which stimulate the production of antitoxins have been used with some success in the control staphylococci mastitis. The toxoids may be valuable in preventing staphylococcic udder infections and reducing acute attacks, but they probably have little value in eliminating existing infections. Some of the vaccination studies were questioned from the viewpoint of experimental methods, and some factors which should be considered in vaccination experiments and experimental infections were discussed.—[*R. W. Brown: Staphylococcic Antitoxins in Dairy Cattle. I. A Review of the Literature. Am. J. Vet. Res., 21, (Nov., 1960): 1006-1014.*]

Pathways of *Listeria monocytogenes* Infection

Four of 17 sheep given *Listeria monocytogenes* directly in the infraorbital or superior buccal nerve (branches of the trigeminal and facial nerves respectively) developed listeriosis with localization of the infection in the central nervous system. Five other sheep had either lesions of the central nervous system or clinical signs, or both (2 sheep), suggesting infection.

The positive results may be interpreted as supporting the belief that infection occurred either by a hematogenous route or along the pathway of the trigeminal or facial nerve. The negative results (13 of the 17 sheep) indicate that Listeria organisms do not always move from a peripheral branch of the trigeminal or facial nerve to the brain.—[*G. Borman, C. Olson, and D. Segre: The Trigeminal and Facial Nerves as Pathways for Infection of Sheep with Listeria monocytogenes. Am. J. Vet. Res., 21, (Nov., 1960): 993-1000.*]

Enteroviruses of Swine

During a study at a municipal farm established for breeding and rearing swine, it was found that swine enterovirus, almost always present in feces of young pigs by 10 weeks of age, was not acountable for any significant number of illnesses or deaths among pigs. Thirty-one pigs, dying from various causes, were studied at necropsy. Enterovirus was found in the gastrointestinal tract of 1 pig. Thirteen sick pigs were killed; enterovirus was recovered from the gastrointestinal tracts of 6 pigs, but was not present in visceral tissues.

Swine enterovirus was dispersed widely in pigs and in their habitat. In young pigs, the virus multiplied in susceptible cells of the lower alimentary tract and initiated development of specific antibodies. Antibodies present in colostrum prevented alimentary infection during the first few weeks of life, but thereafter immunity was reinforced as a result of active infection. Houseflies (*Musca domestica*) can carry enterovirus, either on or, possibly, in their bodies. However, in an environment where infection involves almost all pigs, flies do not seem to be necessary transporters of virus from pig to pig. —[*H. A. Wenner, G. W. Beran, and A. A. Werder: Enteroviruses of Swine. II. Studies on the Natural History of Infection and Imunity. Am. J. Vet. Res., 21, (Nov., 1960): 958-966.*]

Newcastle Disease Virus Propagation in Cell Cultures

Several Newcastle disease virus (NDV) strains (B1, Mass.-MK107-1949, NJ-Roakin-1946, and Texas-GB-1948) were grown in both primary and continuous cell cultures and studied to determine their suitability for use as vaccines. The various strains differed considerably in essential characteristics.

The B1 strain grew well in HeLa and human heart cells, but the cell-propagated virus lost its antigenicity and vaccinated chickens did not develop immunity.

The MK107 strain grew well in HeLa, Hep-2, and human heart cells. It did not lose its antigenicity during the cell culture passages, but the relative virulence of the strain limited its use for vaccination purposes.

The Roakin strain was successfully propagated in HeLa, Hep-2, human heart, chicken embryo, and calf kidney cells. The cell-cultured virus stimulated the production of solid immunity in vaccinated chicks.

The GB-Texas strain grew readily in human heart, HeLa, Hep-2, and chicken embryo cells. This virus was highly virulent but, when inactivated with *beta*-propiolactone and adsorbed to aluminum hydroxide, the virus grown in chicken embryo cells was suitable for use as an inactivated vaccine. However, virus propagated in Hep-2 and human heart cells was significantly reduced in its antigenicity.—[*E. Gelenczei and D. Bordt: Studies of Newcastle Disease Virus Strains in Various Cell Cultures. Am. J. Vet. Res., 21, (Nov., 1960): 987-991.*]

Structure of Bovine Urinary Calculi

The use of staining techniques with mucicarmine, toluidine blue, mucihematein, Alcian blue, Sudan black, trichrome, Hale's iron, and the periodic acid-Schiff (PAS) methods revealed considerable detail of the internal structure of siliceous calculi of bovine origin. It was found that the internal structure of these stones varies between the laminated types and the nonlaminated types which may contain smaller stones of varying sizes embedded in an amorphous mucoprotein matrix. The results, based on the specificities of the stains along with earlier published observations, suggest that the mucoprotein matrices of both the laminar and amorphous stones are of the nonacidic type.

With microautoradiograms it was seen that whole, laminar stones placed in solutions of P^{32} or Ca^{45} had only limited diffusion or exchange of these isotopes into the whole stone; *i.e.*, through the laminations. Sectioned stone material placed in solutions of these isotopes had extensive diffusion or exchange, apparently parallel to the laminations. The implication of these results in the mechanism of stone formation and the possible use of the techniques as an experimental tool for studying the rate of formation of stones is discussed.

By chromatographic analysis, the mucopolysaccharide portion of the mucoprotein matrix has been shown to contain sugars at the relative concentrations listed: galactose (++++), mannose (+++), fructose (++), rhamnose (++), and glucose (+). In some stones, there was a trace of xylose (+ or less.)—[*R. F. Keeler: The Internal Structure and Composition of Siliceous Urinary Calculi of Bovine Origin. Am. J. Vet. Res., 21, (May, 1960): 428-436.*]

New Books

Asexual Propagation and Regeneration

This book, written by specialists in regeneration research, is a compilation of original opinions and data obtained by the authors and their co-workers. There is a summary of the chief research work in regeneration from its very beginning. A whole chapter is devoted to regeneration of organs in mammals, a subject which has been discussed in medical literature in limited fashion only. References and bibliography are current. Concepts are well illustrated in full detail and broad generalizations are given and general laws deduced.

There are 3 parts. The first describes the processes of asexual reproduction, the second, the process of regeneration under normal conditions (physiologic regeneration), whereas the third part describes the processes of regeneration following injury (reparative regeneration). A comparison of these 3 processes reveals that they are closely related and may be explained on similar bases. Subject matter is presented according to separate animal groupings.

The book is intended for medical scientists, biologists, and students. The writing is simple and direct. It is said to be one of our best English translations from the Russian. Production quality is slightly substandard because photo lithography is used rather than letter-press techniques. This less expensive process was used to help offset the high costs of translation and to expedite availability of the work.—[*Asexual Propagation and Regeneration. By M. A. Vorontsova and L. D. Liosner. Tr. from the Russian by P. M. Allen. 489 pages; illustrated. Pergamon Press, New York, N. Y. Price $12.00.*]

NEWS

Scientific Exhibits and Demonstrations Invited for Detroit Meeting

More emphasis will be placed on educational scientific exhibits and demonstrations than ever before at the AVMA meeting in Detroit next August.

The AVMA Executive Board, to encourage greater interest in this type of program at the meetings, has planned better accommodations and more space for scientific exhibitors and demonstrators at Detroit's new Cobo Hall.

The Executive Board feels that the scientific exhibit provides an opportunity for a speaker appearing on the scientific program to present supplementary information or techniques not suitable for his formal presentation. Such information, prepared as an exhibit and manned by the author or his associate, provides an opportunity for a personal exchange of information between the author and viewers of his exhibit. Details of a scientific presentation best explained in graphs, tables, and pictures can more easily and understandably be presented in an exhibit than in a formal presentation when there is a viewing time limit.

Because study has shown that the viewer comprehension of manned exhibits is practically 100% as compared to about 50% comprehension of unmanned exhibits, AVMA scientific exhibitors will be requested to man their exhibits in person whenever possible and to provide informed substitutes when they cannot be at the exhibit.

Demonstrations of clinical techniques, laboratory methods, or special uses of scientific apparatus at scheduled times during the convention are also invited. It is hoped that the demonstrations will serve as an idea exchange between skilled scientists and practitioners. They can be correlated with or be supplementary to television demonstrations or formal presentations on the scientific program.

To be eligible to show a scientific exhibit or conduct a demonstration at AVMA meetings, applicants will have to be either members in good standing of the AVMA, or of professions allied to veterinary medicine (dentists, physicians, pharmacists, research workers, scientists, teachers).

All exhibits and demonstrations will have to be shown in the name of the person or persons who worked on the material. The name of sponsoring organizations may appear as part of the address. An organization may exhibit under its name only when a special invitation has been issued by the AVMA for this purpose.

Applications, which must be submitted by April 15, 1961, are available from the Business Manager, AVMA, 500 S. Michigan Ave., Chicago 5, Ill. Completed applications will be reviewed by qualified scientists and acceptance or refusal letters will be mailed by the AVMA by May 15, 1961.

AVMA Board of Governors Meets with Committee of AMA Board of Trustees

On the occasion of a meeting of the AVMA Board of Governors in Chicago, February 2, a joint session of the Board was held with a committee of the Board of Trustees of the American Medical Association.

At the session, the AMA representatives recognized the role of veterinarians in medical research, especially in research involving laboratory animals. They felt there was a need for more well-qualified veterinarians to carry on work in this field in the years ahead, and agreed to work with the AVMA in encouraging research institutions to train and employ such veterinarians.

Through the session, AVMA and AMA have also joined hands in a study of tech-

niques used in the distribution of drug information, and in an exchange of information on organizational views presented in the journals of both organizations. It was also firmly established that both associations stand opposed to Cooper-Griffiths type of legislation. Regular meetings of the staff personnel of the 2 organizations were strongly urged.

At the AVMA Board of Governors meeting, the Board expressed concern about the shortage of qualified students seeking careers in veterinary medicine. They reviewed the AVMA career recruitment program and approved plans for the AVMA to work with the National Association of Guidance Counselors, constituent associations, veterinary schools, and student chapters in implementing this program.

The Board of Governors also agreed that the AVMA should accept an invitation from the American Feed Manufacturers Association to hold a joint officers' meeting to better the liaison between the 2 groups.

AVMA insurance consultants appeared before the Board to discuss the feasibility of an AVMA-sponsored pet hospitalization plan. The Board requested that a report be prepared answering the questions: Can a sound plan be developed? Can it be legally and ethically promoted? Is there public (pet owner) demand that will support such an undertaking?

During a discussion of the AVMA convention to be held in Detroit next August, the Board of Governors appointed an ad hoc committee of the Executive Board to study plans for improving scientific programs at the annual meetings.

After reviewing rising costs of conventions, the Board agreed that registration fees for the Detroit meeting would be $8 for members and their guests, $5 for wives, $3 for children, and $15 for nonmembers.

It was also agreed that the meeting of the House of Delegates should be held on Saturday and Sunday, August 19 and 20, rather than on Friday and Saturday as scheduled in previous years.

The Board urged that plans be formulated for a joint meeting in Chicago between constituent V.M.A. public relations counselors and the AVMA's director of public information. The meeting will provide constituent associations with the opportunity to establish closer cooperation between their public relations counselors and the AVMA's director of public information. It is hoped that the meeting, for which plans are now being developed, will strengthen and unify the profession's public relations activities on all levels.

Letters directed to the new Secretary of Agriculture, Orville W. Freeman, and Secretary of Health, Education and Welfare, Abraham I. Ribicoff, were approved for transmittal by the Board of Governors. The letters express the Association's interest in the many activities of both federal departments and offer the assistance and cooperation of the AVMA.

AVMA Officers and Staff on the Move

The old saying "A rolling stone gathers no moss" certainly can be applied to AVMA's officers, staff and representatives. During the past 2 months they have been on the move, attending meetings across the country from New York to California, from Arkansas to Ontario. There has been AVMA representation at more than 23 meetings during January and February.

Here's a list of the meetings attended by AVMA representatives:

Jan. 11-14	*Intermountain V.M.A.*, Salt Lake City, Utah, Drs. M. L. Morris and Arthur Freeman
Jan. 12	*Indiana V.M.A.*, Indianapolis, Dr. J. R. Hay
Jan. 12	*Colorado State Student Chapter*, Fort Collins, Dr. M. A. Emmerson
Jan. 15-17	*Kansas State V.M.A.*, Manhattan, Dr. E. E. Leasure
Jan. 15-17	*Wisconsin V.M.A.*, Milwaukee, Mr. R. D. Morrison and Mr. H. R. Kuehn
Jan. 16	*Ontario Student Chapter*, Guelph, Dr. A. F. Sellers
Jan. 16-18	*Iowa State V.M.A.*, Des Moines, Dr. M. L. Morris
Jan. 22	*National Lamb & Wool Conference*, Denver, Colo., Drs. Harry F. Furgeson, James O. Tucker, John F. Ryff, and Floyd Cross
Jan. 22-24	*Tennessee V.M.A.*, Nashville, Dr. S. F. Scheidy
Jan. 23-24	*Arkansas V.M.A.*, Little Rock, Dr. D. A. Price
Jan. 23-25	*Minnesota V.M.A.*, Minneapolis, Drs. M. L. Morris and Arthur Freeman

Jan. 29-21	*Texas V.M.A.*, Houston, Drs. C. E. Hofmann and D. J. Anderson
Feb. 3-4	*AMA Council on Rural Health*, Chicago, Ill., Drs. J. R. Hay and H. E. Kingman, Jr.
Feb. 5-8	*Ohio State V.M.A.*, Toledo, Dr. E. E. Leasure
Feb. 13-14	*Conference.* Cornell University, Dr. D. A. Price
Feb. 14-17	*Livestock Advisory Committee*, ARS, Washington, D.C., Dr. H. E. Kingman, Jr.
Feb. 19-21	*Missouri V.M.A.*, St. Louis, Dr. J. R. Hay
Feb. 19-21	*Virginia V.M.A.*, Roanoke, Dr. L. M. Jones
Feb. 20-22	*Illinois V.M.A.*, Chicago, Dr. C. M. Rodgers
Feb. 22-23	*Livestock Conservation, Inc.*, annual meeting, Des Moines, Iowa, Dr. H. E. Kingman, Jr.
Feb. 23	*District of Columbia Association of Veterinary Medicine*, Dr. M. L. Morris
March 1	*New York City V.M.A.*, Dr. M. L. Morris

Livestock Conservation, Inc., Views Progress of Past Year

"LCI interest spans the nation," states Livestock Conservation, Inc., in its recently released 1960 activities report to members. During the past year, LCI reports that it has received requests for information and educational material from 49 states, enrolled 28 states in a 4-H livestock conservation demonstration activity, and sent LCI officers and staff members to more than 50 major livestock industry meetings from coast to coast.

LCI had just one year ago re-aligned its program to fill national needs. It has placed major emphasis during this year on the development of information and education materials. Materials have been developed and distributed on the safe handling of livestock, cattle grub control, and hog cholera eradication. Other materials have been geared to informing membership and cooperators about LCI activities, and creating an awareness of the importance of livestock conservation in areas not now included in LCI membership.

Other major 1960 activities have been the organization of "cooperating affiliates" in the Omaha and Denver areas to continue the active livestock conservation programs already in progress; cooperation with the USDA in completing studies of relation of handling and other conditions in losses of both hogs and sheep; cooperation with other interested groups in a large scale, range test of a systemic "grubicide" spray; cooperation in a series of hog cholera eradication conferences; and dissemination of information through handling requests for assistance in solving specific livestock conservation problems.

AVMA Executive Secretary Dr. Harry E. Kingman, Jr., is president of Livestock Conservation, Inc.

Hog Cholera Eradication Committee Makes Recommendations

On Jan. 16, 1961, leaders from the meat industry, agriculture, the federal government, and the AVMA met at the Chicago AVMA headquarters to discuss and put into action a program for eradicating hog cholera from the United States.

Organizations represented: National Swine Growers Council, American Farm Bureau Federation, National Grange, American Meat Institute, National Independent Meat Packers Association, Association of Land-Grant Colleges, U.S. Livestock Sanitary Association, U.S. Department of Agriculture, Animal Disease Eradication Branch, and American Veterinary Medical Association. Major pork processors included Rath Packing Company, Armour and Company, Cudahy Packing Company, Wilson and Company, Reliable Packing Company, and Emge Packing Company.

Seven specific recommendations were made as a result of the conference. They were:

1) Request USDA to draft a tentative hog cholera eradication bill for consideration of all interested organizations.

2) Request USDA to draw up proposed long-term program of hog cholera eradication.

3) Make efforts to get the full support of all trade associations, general farm and

producer organizations, and other interested groups concerned with any phase of the swine industry in the development and promotion of a hog cholera eradication program and urge national organization representatives to exchange views and make known their respective positions in relation to the National Hog Cholera Committee of LCI.

4) Set up necessary subcommittees of the National LCI Hog Cholera Committee to keep abreast current developments and to expedite a hog cholera eradication program when it is launched.

5) Upon implementation of an eradication program, urge the Secretary of Agriculture to set up an advisory council on hog cholera eradication similar to the one established under the vesicular exanthema program.

6) In order to develop uniformity in state hog cholera eradication programs, establish liaison immediately between the Council of State Governments and Livestock Conservation, Inc.

7) Inform members of Livestock Conservation, Inc., and the National Hog Cholera Committee of the suggestions and recommendations of this group and make available copies of all legislative proposals.

Booklet on Hog Cholera Available

A new 16-page booklet, "Hog Cholera Can Be Eradicated," has recently been published by Livestock Conservation, Inc., in cooperation with the National Hog Cholera Committee. The booklet is based upon information exchanged by national and international swine authorities and industry leaders at 4 regional conferences on hog cholera.

Some topics covered in the booklet are present knowledge of the disease, value of immunizing agents, programs for hog cholera immunization, and ramifications of the disease. A complete outline of a hog cholera eradication program now being used in Florida is included in the booklet. It also contains recommendations of the National Hog Cholera Committee for elimination of the disease.

Cooperating in the regional conferences from which the information in the booklet was gathered were Livestock Conservation, Inc.; National Hog Cholera Committee; Federal Extension Service; Animal Disease Eradication Branch, USDA; and U. S. Livestock Sanitary officials. Dr. Frank J. Mulhern (AUB '45), associate director, Animal Disease Eradication Branch, Agricultural Research Service, USDA, is chairman of the National Hog Cholera Committee.

Copies of the booklet are available from Livestock Conservation, Inc., 405 Exchange Building, Chicago 9, Ill. The price is 10¢ each, postpaid, and $7.00 per 100, postpaid.

National Laboratory Needs Research Personnel

The National Animal Disease Laboratory at Ames, Iowa, is now nearing completion. Equipment is being installed, and it is expected that productive work will begin shortly after July 1, 1961.

This laboratory will serve 3 divisions of the Agricultural Research Service of the U.S. Department of Agriculture—the Animal Disease and Parasite Research Division (research), the Animal Disease Eradication Division (diagnosis), and the Animal Inspection and Quarantine Division (control of veterinary biological products).

The laboratory is being equipped with the most modern facilities for the study of animal diseases. Substantial enlargement of the present scientific and technical staff will be necessary to operate the new facilities. Arrangements have been made with the Graduate School of Iowa State University, also located in Ames, whereby junior staff employees may improve their educations while working. The majority of positions require a veterinary degree but there are major openings for men trained in cytology, microbiology, virology, biochemistry, biophysics, and other specialties, who do not necessarily have to have a D.V.M. degree. The greatest number of opportunities are for those who, in addition to the D.V.M. degree, have had substantial experience in research on animal diseases. Generally speaking, only U.S. citizens are eligible for appointment.

All positions are under Civil Service and applications must be made through that channel. No examinations are required for scientific and professional applicants; they are rated upon the basis of education and experience.

A number of project leaders are among the persons sought. These must be mature persons with substantial productive research experience.

Interested persons are invited to write, giving a brief outline of their training and experience to: Dr. W. A. Hagan, Director, National Animal Disease Laboratory, Box 70, Ames, Iowa.

Flying Veterinarians Association Planned

Fly an airplane for business . . . pleasure? A number of veterinarians do, and they are forming an association.

Members of the Flying Veterinarians Association will have to be veterinarians and licensed pilots. The association's purpose will be to bring together people with like interests through meetings and exchange of information by mail.

The organizational meeting of the association will be held in St. Louis, Mo., during the meeting of the American Animal Hospital Association in April. A preliminary announcement of the meeting placed in the *Animal Hospital Bulletin* in December brought as many as 15 responses from veterinarians in 8 states from New York to California. Another meeting is being scheduled to take place during the AVMA convention in Detroit in August.

Veterinarians who have expressed interest in the association will start getting membership benefits even before it's organized. They will be receiving travel information on flying to St. Louis for the meeting.

Pilots getting the association off the ground are: Drs. Chet R. Griffith (COL '50), Seattle, Wash.; F. P. Sattler (OSU '54), Fullerton, Calif.; and Jack R. Dinsmore (OSU '41), Glenview, Ill.

Veterinarians interested in learning more about the association should contact Dr. Jack R. Dinsmore, Box 233, Glenview, Ill.

USDA Sponsors Symposium on Poultry Health

A symposium on poultry health and related problems will be sponsored by the USDA at the Center for Continuing Education, University of Georgia, Athens, March 20-22, 1961.

The program is being planned primarily for research workers and scientists concerned with poultry problems in both public agencies and industry.

Topics scheduled for discussion are diseases and environmental and management factors related to poultry health. Practical means of overcoming current difficulties in the poultry industry through joint action by scientists, state and federal regulatory workers, and poultry producers and processors will be discussed.

The symposium will take place in the Southeast section of the country in recognition of the growing importance of this area in production of both eggs and poultry meat.

USDA efforts to solve poultry health problems will be intensified in 2 new poultry research laboratories planned for that region. One of these laboratories will be located at Athens, and the other at State College, Miss. Each will be staffed with veterinarians, agricultural engineers, and poultry husbandmen, working together as a team to improve poultry health through research.

AVMA Fellow John W. Davis Received Ph.D. Degree at Purdue

Dr. John W. Davis (OSU '52), an AVMA fellow from 1956 to 1958, received his Ph.D. degree from Purdue University in 1958 with the thesis "Some Studies of Swine Dysentery." He is now a professor of veterinary science in the Department of Veterinary Science, Virginia Polytechnic Institute, Blacksburg.

Dr. John W. Davis

Dr. Davis' current research interest is in edema disease in swine and synovitis in poultry.

Dr. Davis is a member of the AVMA, the U. S. Livestock Sanitary Association, and the Western Virginia V.M.A.

USDA Gives Research Grants to Israeli and Polish Institutions

Two grants totaling nearly $45,000 have been made to research institutions in Israel and Poland for studies of respiratory diseases in chickens and the changeability of biological properties of viruses, the USDA has announced.

The Israeli grant of $29,189 went to the Hebrew University, Rehovot, to support a 3-year study on the prevention and control of chronic respiratory diseases in chickens and on chemistry of the causative agents.

The Polish grant, $15,657, was made to the Institute of Veterinary Research, Pulawy, for a 4-year study of the biological changes that occur in viruses. Although Newcastle disease will be used in the studies, scientists expect the results to apply broadly to viruses affecting plants, animals, or man.

The grants were awarded under a program financed by foreign currencies accruing to the credit of the United States from the sale abroad of surplus agricultural commodities.

The research is administered by the foreign research and technical programs division of USDA's Agricultural Research Service.

Intermountain V.M.A. Meets

Approximately 100 veterinarians attended the Thirty-Third Annual Meeting of the Intermountain Veterinary Medical Association, Jan. 12 to 14, 1961, at Hotel Newhouse in Salt Lake City, Utah.

Historically, the meeting has emphasized the regulatory aspect of veterinary medicine. However, in addition to those parts of the program directed at regulatory veterinarians, a number of excellent presentations were offered for veterinary practitioners. Especially well received was the Night Clinic held the evening before the official meeting in which 9 topics devoted mainly to practical veterinary medicine were presented. Subjects discussed were Large Animal Practice Procedures, Laboratory Techniques, Practice Tips, Use of Wound Clips in Large Animal Surgery, Telephone Techniques, Spinal Tumor Diagosis, Anesthesia for Cesarean Operations, Casts for Pet Animals, and Pregnancy Testing in Mares.

Highlighting the meeting was an address by AVMA President-Elect Dr. Mark L. Morris about the problems of veterinary medicine in the Rocky Mountain empire, a discussion of livestock production research in a changing agriculture by ARS Administrator, Dr. Byron T. Shaw, and small animal medicine discussions by Dr. Wayne H. Riser (ISU '32), research pathologist, AFIP, and president, AAHA, Kensington, Md., and Dr. Kerry Willetts (ONT '45) of Los Angeles, Calif.

Success of the meeting was credited to the local arrangements committee, headed by Chairman Edward A. Tugaw (WSU '54) and Co-chairman Roy A. Nipko (COL '38).

Governor George D. Clyde of Utah gave the welcoming address at the first morning session, and Dr. H. E. Schaulis (KSU '29) president of the IVMA, also addressed the group. Mrs. H. E. Schaulis is currently president of the Women's Auxiliary of the IVMA.

Dr. E. E. Moon Appointed to Chicago Stockyards

Dr. E. E. Moon (ISU '40) was appointed assistant veterinarian in charge at the Chicago Stockyards, Chicago, Ill., in August, 1960. He was formerly assistant veterinarian in charge, Jackson, Miss.

Dr. Moon entered federal service in 1940 with the Bureau of Animal Industry, At-

Dr. E. E. Moon

lanta, Ga. During World War II he was with the Armed Forces. In 1946 he returned to the Bureau of Animal Industry in Illinois as field veterinarian, a position he held until 1957. He participated in the Fourth Veterinary Administrator Development Program, and in 1958 became assistant veterinarian in charge, Jackson, Miss.

Dr. Moon is a member of the Mississippi V.M.A., the National Association of Federal Veterinarians, and the Chicago USDA Club.

Dr. A. M. Galang Transferred to Detroit

Dr. Angel M. Galang (PHI '41) has recently been promoted to inspector in charge of the Detroit, Mich., Meat Inspection Division station, USDA. He will replace Dr. C. E. Mootz, Jr., who has been transferred to Washington, D.C. Dr. Galang went to his new position from Omaha, Neb., where he had held supervisory positions since entering duty with the division in 1951.

Dr. Angel M. Galang

Dr. Galang was born and raised in the Philippine Islands near Manila. He served in the U.S. Army forces in the Far East and was discharged from the Army in July, 1946. He then joined the meat inspection force of the Manila Health Department and remained there for one year. Following that, he served as city veterinarian for Pasay from 1947 to 1951. In 1951 he received a transfer to Omaha and began work in the federal Meat Inspection Service.

Dr. C. E. Mootz, Jr., Promoted by USDA

Dr. Charles E. Mootz, Jr. (MSU '44), has recently been promoted to assistant staff officer for special projects and federal-state relations of the Meat Inspection Division, USDA, Washington, D.C.

Dr. Charles E. Mootz, Jr.

Dr. Mootz had been inspector in charge of the Meat Inspection Division station at Detroit, Mich., for several years. Previous assignments were held by him at Chicago, Ill., and Boston, Mass. He entered federal service in Boston in 1948.

Dr. Mootz represents the second generation of his family to work in meat inspection. His father, Dr. C. E. Mootz, Sr. (CIN '12), retired in 1956 after more than 40 years of service. At the time of his retirement, Dr. Mootz, Sr., was the inspector in charge at the Philadelphia, Pa., station.

Dr. G. A. Franz Retires

The Meat Inspection Division, USDA, has announced the retirement of Dr. G. A. Franz (KSU '18), assistant director for the South-

Dr. G. A. Franz

ern Area, following 42 years of service.

Dr. Franz entered federal service at Omaha, Neb., in August, 1918. Following his Omaha assignment, Dr. Franz held the position of inspector in charge at Dubuque, Iowa; Indianapolis, Ind.; and St. Louis, Mo. In May, 1958, he was named assistant director for the Southern Area.

Dr. Samuel J. Berger, of the Washington staff, has been named to succeed Dr. Franz.

Dr. S. J. Berger Transferred

Dr. Samuel J. Berger (COR '32) has recently been named assistant director for the Southern Area of the Meat Inspection Division, USDA, with headquarters at St. Louis, Mo. In his new position Dr. Berger will succeed Dr. G. A. Franz, who retired recently.

The new assistant director entered meat inspection service at St. Joseph, Mo., in 1934 and has held supervisory positions at Boston, Mass.; New York, N.Y.; Chicago, Ill.; Providence, R.I.; Indianapolis, Ind.; and Washington, D.C.

Dr. Samuel J. Berger

Dr. W. C. Patterson to Direct Southeastern Poultry Disease Research Laboratory

Dr. William C. Patterson (UP '49) has been named director of the Southeastern Poultry Disease Research Laboratory to be established at Athens, Ga. This laboratory is a part of the research activities of the Animal Disease and Parasite Research Division, ARS, USDA. It will provide facilities for intensified research for protection of the $4.5 billion poultry industry.

Dr. William C. Patterson

Dr. Patterson, a member of the Animal Disease and Parasite Research Division for 9 years, has conducted research studies with viral diseases of animals. He was a member of the planning committee for constructing and equipping the new National Animal Disease Laboratory now nearing completion at Ames, Iowa.

Dr. C. C. Hamilton Transferred to Minnesota

Dr. Clare C. Hamilton (KSU '39) has recently been promoted to assistant inspector in charge of the South St. Paul, Minn., station of the Meat Inspection Division, USDA. He went to his new post from Davenport, Iowa, where he had been the inspector in charge since 1958.

Dr. Clare C. Hamilton

Dr. Hamilton entered the meat inspection service in 1946 at Kansas City. He has served in a supervisory capacity at St. Louis and as inspector in charge at Suffolk and Norfolk, Va., since that time.

Among the States and Provinces

Alabama

VETERINARIANS INVITED TO JOINT COMMITTEE ON RURAL HEALTH.—At the meeting of the Alabama Committee on Rural Health in Sycaulauga, Nov. 6, 1960, Alabama veterinarians were invited to join the committee.

Dr. J. R. Dunlap (AUB '48), president of the Alabama V.M.A., has appointed Dr. Samuel R. Monroe (AUB '50), to represent the association.

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MOBILE-BALDWIN COUNTY V.M.A. ELECTS NEW OFFICERS.— New officers elected by the Mobile-Baldwin County V.M.A. are: Drs. Lawrence W. Cottle, Jr. (AUB '44), Mobile, president; Cecil S. Yarbrough (AUB '42), Mobile, president-elect; and Allison D. Reed (AUB '52), Mobile, secretary-treasurer.

California

UNIVERSITY OF CALIFORNIA RECEIVES GRANT FOR VETERINARY PATHOLOGY FROM NIH.—The National Institutes of Health have given a research training grant for support of Ph.D. work in veterinary pathology to the University of California. The grant will support 3 trainees devoting full time to a program of course work, case work, and research experience. It was given with a view to producing capable pathologists and effective research workers.

The stipends will not be less than $5,500 annually. Appointments will be made for 1 year, renewal being based upon satisfactory progress. Candidates should be able to complete the degree work in about 3 years. Their training will be mainly in tissue pathology, and interdisciplinary interests will be encouraged. To be eligible for the appointment, applicants must have a D.V.M. degree or anticipate receiving one in June.

Inquiries and requests for application forms should be directed to Dr. D. R. Cordy, Department of Pathology, School of Veterinary Medicine, University of California, Davis. Application deadline for June appointments is April 1, 1961.

Florida

HOSPITAL CONSULTATION PROGRAM AVAILABLE.—A veterinary hospital consultation program is now functioning in Florida. Under the plan, veterinarians can receive individual suggestions on improving services, public relations, business methods, and income.

During the past few months, veterinarians of the South Florida V.M.A. have served as

a pilot group to determine the value of the program. Dr. Sanford Bronstein, director of the outpatient clinic of Jackson Memorial Hospital, Miami, is the consultant. Each veterinary hospital in the program was visited by Dr. Bronstein, who offered suggestions for improvement. The state society then received unidentified copies of consultation reports and photographs of the veterinary hospitals visited. The consultation fee was $25 payable to the Florida V.M.A. By the end of 1960, approximately 50 hospitals had been studied.

The Florida V.M.A. has voted to continue the plan on an annual basis and soon the program will be extended to all veterinary hospitals in the state. The program is an outgrowth of consultations which have been effective in Miami hospitals for the past 3 years. Dr. Jack O. Knowles (UP '38), Miami, is chairman of the Florida V.M.A. committee directing the project.

s/M. W. Emmel, D.V.M., *executive secretary*

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NIH Awards Grant for Replantation Study.—The National Institutes of Health have awarded a 2-year, $30,000 grant for a study of "Replantation of Amputated Limbs." The grant was awarded to Drs. Clifford C. Snyder and Robert P. Knowles (AUB '44), Miami, to aid them in their research at the Variety Children's Hospital Research Foundation.

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It has been estimated there are 100 to 150 Cuban veterinarians in the Miami area who have reached this country as refugees from Cuba. While these men are not licensed in the United States and cannot practice, they are desirous of working as kennel men or on other jobs in order to honestly support themselves and, in some cases, their families.

Veterinarians who have such positions to offer, regardless of distance from Miami, should write Dr. Fausto Waterman, P.O. Box 681, Riverside Station, Miami, Fla.

s/M. W. Emmel, D.V.M., *executive secretary*

Indiana

Indiana V.M.A. Elects New Secretary.—Dr. Frederick A. Hall (COR '23), Lafayette, has been elected secretary to the Indiana V.M.A.

Dr. Hall has been a professor of veterinary science at Purdue since 1950. He had previously maintained a practice in Iowa for 2 years and then in DeKalb County, Ind., for 25 years.

Dr. Frederick A. Hall

One of Dr. Hall's 3 children, Arthur E. Hall (MSU '54) is also a veterinarian. Another son, Marshall, is a physician, and a daughter, Virginia, is a dental hygienist.

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Indiana V.M.A. Endorses Legislation to Put Veterinarians on Boards of Health.—At the recent annual meeting of the Indiana V.M.A., the association voted to promote legislation now before the Indiana General Assembly which will place a veterinarian on each city, county, or combined board of health in the state.

The bill is being sponsored by 2 senators on the Indiana Senate Public Health Committee. It has the full endorsement of not only the Indiana V.M.A., but also the Indiana State Board of Health, the Indiana Public Health Association, and the Indiana Medical Association.

The bill, possibly the first of its kind in this country, adds 2 members to each health board, requiring that one of the additional members be a graduate veterinarian. As it is written, each county will select the veterinarian to serve on its board.

Since the Indiana legislature will be meet-

ing until the middle of March, it should be known by then whether the bill will pass. Three veterinarians serving as legislative contacts for the passage of the bill are: Drs. Lowell W. Hinchman (OSU '41), Glenwood; I. Dale Richardson (OSU '44), Hartford; and Lawrence M. Borst (OSU '50), Indianapolis.

The bill came into being after 4 years of work by the Indiana V.M.A. In urging the bill's passage, the association is pointing out the training and experience of a veterinarian which will enable him to efficiently serve on boards of health. They are also pointing out that the veterinary profession has already been entrusted with the responsibility of ensuring the fitness of meats, poultry, and like products for human consumption.

Kansas

KANSAS V.M.A. ELECTS NEW OFFICERS.—Officers elected at the annual meeting of the Kansas V.M.A. are: Drs. Fayne H. Oberst (KSU '43), Manhattan, president; K. Maynard Curts (TEX '41), Shawnee Mission, president-elect; William D. Elliot (KSU '43), chairman of the board of directors; and Jacob E. Mosier (KSU '45), Manhattan, treasurer.

Dr. Melvin W. Osburn (ISU '34), Manhattan, was appointed executive secretary by the association's board of directors.

Maine

MAINE V.M.A. MEETS.—New officers elected at the winter quarterly meeting of the Maine V.M.A. last January are: Drs. Camille Gardner (UP '51), Lewiston, president; Robert Monahan (UP '47), Brunswick, vice-president; and J. F. Witter (MSU '32), Orono, secretary-treasurer.

Recommended changes in bylaws were presented to the association members at the meeting. The major change suggested was that all association business be transacted by a board of directors consisting of the officers. It is hoped that this change will allow more time during the association's quarterly meetings for scientific programs.

Dr. Crosby French (ONT '10), Rockland, was honored for having provided 50 years of veterinary service to Rockland, Maine.

The Maine V.M.A. will host the New England V.M.A. meeting in Poland Springs next October. New England V.M.A. President, Dr. Lewis B. Denton (COR '32), Houlton, appointed committee chairmen for the meeting.

Dr. John Woodcock (ONT '38), left, retiring Maine president, congratulates Dr. Crosby French on the completion of 50 years of continuous veterinary service to Rockland, Maine.

Some of the veterinarians appointed are: Drs. Henry Bither (COR '51), Portland, large animal program; F. Langdon Davis (COR '49), Augusta, small animal program; Harold Chute (ONT '49), Orono, poultry program; G. W. Breed (CVC '18), Hallowell, regulatory program; and Allan Corey (ONT '56), Augusta, exhibitors and treasurer.

Minnesota

JOINT VETERINARY-PHARMACEUTICAL COMMITTEE DISCUSSES DRUG SUPPLY PROBLEMS.—A joint committee of the Minnesota State V.M.A. and the Minnesota State Pharmaceutical Association met recently to discuss problems of indiscriminate sale and use of drugs.

The following decisions were made at the meeting: The sale of antibiotics should be restricted to those trained in their use. Drug advertising should be screened by both groups, and misleading advertising should be reported to the Federal Trade Commission and to the secretary of the Minnesota Veterinary Medical Association. Feed dealers should confine their activities to the

sale of feed and growth-promoting levels of feed additives. Sale of medicated feeds and drugs by feed dealers should be prohibited. Since the only practical way to control the sale of drugs is by legislation, both associations should seek legislation that will prohibit the sale of potentially dangerous and deleterious drugs to the public.

Missouri

MISSOURI V.M.A. NAMES EXECUTIVE DIRECTOR.—Mr. Jack Kroeck has been selected to serve as executive director of the Missouri V.M.A. He took over his responsibilities Jan. 1, 1961.

As executive director, Mr. Kroeck will serve as business manager of the association, direct its public relations program, edit the association's publication, serve as legislative counsel in making and maintaining contacts with the general assembly, handle arrangements with the local committee on arrangements for the association's annual convention, and serve as liaison between the state association, its district associations, and groups with allied interest. He will maintain an office in Jefferson City.

Mr. Kroeck was formerly farm director of radio and television stations in Kansas City and Jefferson City. At one time he taught vocational agriculture and was president of the Missouri Vocational Agriculture Teachers Association.

• • •

GREATER ST. LOUIS V.M.A. REVIEWS PUBLIC RELATIONS PROGRAM.—Among activities stressed in the public relations program of the Greater St. Louis V.M.A. during the past year have been the preparation of a data kit about the veterinary profession, the participation of veterinarians on a local radio program, and the organization of a publicity program for 2 conventions.

The progress of these projects and the plans for several new ones were reported to the association at its January meeting by its public relations counsel, Fleishman-Hillard, Inc.

The association's public relations program was begun last April. It was developed after a survey of members indicated that veterinarians in the area felt a need for better communications among themselves and with the community.

The data kit now being prepared by the association will contain information about the local association, veterinary associations across the country, and the work of the profession. It will be distributed to community leaders; radio, television, and newspaper people; libraries; schools; and civil defense authorities.

Also among the projects of the past year was the organization of publicity programs for the Missouri State V.M.A. meeting in February, and for the American Animal Hospital Association convention in April. The association will work with both groups in distributing news stories of convention activities.

The association is currently furthering public relations for veterinarians in the community by participating once a week in an hour-long radio program, "At Your Service." A monthly newsletter sent to all members is also part of the association's intensified public relations program.

Planned for the months ahead are the development of a speakers bureau to enhance veterinarians' participation in civic activities, a civil defense program to utilize veterinarians in the event of a community disaster, and a career recruitment program to stimulate interest and knowledge of the veterinary profession.

Nebraska

NEBRASKA V.M.A. MEETS.—A highlight of the Nebraska V.M.A. meeting in Lincoln, Dec. 7-9, 1960, was the presentation of the "Veterinarian of the Year" Award. It was given to Dr. George A. Young (COR '43), Department of Veterinary Science, University of Nebraska, for his work in specific pathogen-free pig research and development.

An honorary membership in the association was presented to Mr. Norman Underdahl, also of the Department of Veterinary Science, University of Nebraska, for his work on the project.

The highlight of the meeting sessions was a variety of round-table discussions held during one of the luncheon periods. There were 7 tables at which meeting registrants could choose to sit. At each table one problem related to veterinary practice was discussed during the luncheon. Each table had an appointed discussion moderator.

Contributions to the Dr. Rex Emery Memorial Student Loan Fund were encouraged at the meeting. The fund was created earlier this year in memory of Dr. Emery who was president of the association at the time of his death. Contributions will be used to give financial assistance to deserving veterinary students.

New officers of the Nebraska V.M.A. elected at the meeting are: Drs. Jack Cady (KSU '42), Arlington, president; Dale Karre (COL '48), Ord, vice-president; and N. C. Gustafson (KSU '44), Hastings, secretary-treasurer.

Principal speakers at the meeting were L. W. Slanetz, professor of bacteriology, University of New Hampshire; and Clifton Parker, former Vermont attorney general.

Pennsylvania

UNIVERSITY OF PENNSYLVANIA TO SPONSOR SYMPOSIUM.—The University of Pennsylvania will sponsor a symposium on "Arthritis, Tendosynovitis, and Related Disorders in the Horse," on April 18, 1961. The meeting will be held in the Museum of the University of Pennsylvania.

For further information write to the Dean's Office, School of Veterinary Medicine, Philadelphia 4, Pa.

Quebec

VETERINARY MEDICINE DISCUSSED ON TELEVISION PROGRAM.—Veterinary Medicine was the subject of a television program broadcast to the Quebec area on Jan. 22, 1961. Dr. Alfred Cherrier, St. Jerome, was interviewed on the program entitled "Work and Days."

A film showing work performed at the School of Veterinary Medicine at Saint-Hyacinthe was also shown.

Vermont

VERMONT V.M.A. ELECTS NEW OFFICERS.—The following officers were elected at the meeting of the Vermont V.M.A. in Montpelier, Dec. 7, 1960: Drs. Roger Prior (MON '50), Burlington, president; R. L. Dumas (MSU '49), Waterbury, president-elect; William Keaton (COR '49), Barre, vice-president; and A. E. Janawicz (TEX '43), Montpelier, secretary-treasurer.

Veterinary Military News

Restraint Seat Developed to Simplify Care of Monkeys

Restraint seat is a necessary tool in working with wild monkeys at the Aerospace Medical Center, Brooks Air Force Base, San Antonio, Texas. Col. Harry A. Gorman (COL '39) feeds a small primate that is free to use its arms but is tightly, and comfortably, kept out of trouble.

Dr. W. W. Armistead Inspects Pacific Air Force Bases

Dr. W. W. Armistead (TEX '38), dean of the veterinary college at Michigan State University and recently named National Consultant in Veterinary Medicine, made an inspection tour of Pacific Air Force Bases. Dr. Armistead was accompanied by Col.

Dr. W. W. Armistead (left) visited the Sentry Dog Center, Showa Air Force Station, Japan, in his recent tour of inspection. Shown with him are: (left to right) Col. Robert R. Miller, T/Sgt. Wolf, Col. John R. Nettles (AUB '35), and Capt. Neil F. Chapman (ISU '51), Tachikawa Air Force Base veterinarian.

Robert R. Miller (OSU '43), assistant surgeon general for Veterinary Services, USAF.

During their trip they visited Air Force installations in Hawaii, Japan, Formosa, the Philippines, and Guam. Hong Kong was also visited enroute. Dr. Armistead gave addresses at joint military veterinary meetings in Tokyo and in Okinawa.

Veterinarians Study Nuclear Medicine

Twenty Army and Air Force veterinary officers and one Canadian civilian veterinarian have recently completed a course entitled "Veterinary Aspects of Nuclear Medicine," at the Walter Reed Army Institute of Research. The course was given December 5-16.

The purpose of the course was to show the veterinary officers how they could best utilize their professional skills in handling radiation problems they might encounter. It was geared to providing them with a basic knowledge of nuclear medicine.

Some of the subjects discussed during the class sessions were the role of the veterinarian in nuclear medicine, radiation, detection, biology, pathology, chemistry, preservation of food, health physics, and the use of radioisotopes in research.

Veterinarians who recently completed the Army course in nuclear medicine are: Front row, left to right—Col. Charles E. Robinson, USAF, coordinator of training; Col. Robert H. Yager, director, Division of Veterinary Medicine; Col. Wayne D. Shipley; and Major Elvin J. McClurkin.
Second row—Capt. Ernest B. Rushing; Lt. Col. Herbert F. Sibert; Lt. Col. Glenn M. McFadden; Major Elmer Lashua; and Major John Q. Adams.
Third row—Lt. Col. Irvin T. Reed; Major Harry Radcliffe; Dr. R. V. L. Walker, Canadian veterinarian; and 1st Lt. Frank L. Black.
Fourth row—Major Russell F. Greer; Major Milliard L. Tierce; Capt. James L. Stookey; Capt. Farrel R. Robinson; Major Samuel F. Huber; and Major Alexander H. Munson.
Last row—Capt. Herbert C. Holk; 1st Lt. James B. Brayton; Major John A. McBee; and 1st Lt. Ivan Rodman, Jr.

Deaths

Star indicates member of AVMA

Donald P. Anderson (KCV '18), 72, Albert Lea, Minn., died Nov. 25, 1960.

Dr. Anderson had been a government poultry inspector at Albert Lea for the past 9 years. He had previously practiced at Klemme, Iowa.

Henry H. Austin (IND '15), 88, died Nov. 23, 1960, at his home in Blocher, Ind.

Dr. Austin had resided in Scott County, Ind., for 76 years.

Clifford B. Bratager (CVC '17), 70, a retired veterinarian of Nevus, Minn., died Nov. 29, 1960.

Dr. Bratager had maintained a veterinary practice in Montrose, S.D., and later became a government meat inspector. He retired in 1954.

★**Gorden W. Cronen** (KCV '14), 71, Albuquerque, N.M., died Oct. 27, 1960.

Dr Cronen had worked for the former U.S. Bureau of Animal Industry in South Dakota and Montana. Before his retirement he was the inspector in charge at the Helena, Mont., meat inspection station, USDA.

Dr. Cronen became a life member of the AVMA in 1956.

★**Samuel R. Dickie** (CVC '18), 62, Paw Paw, Ill., a retired veterinarian, died Oct. 26, 1960.

Dr. Dickie had practiced in Paw Paw from Jan 1, 1923, to Jan. 1, 1955, when he retired. He was a life member of the AVMA.

★**Norman I. Frederickson** (MIN '54), 39, Glencoe, Minn., died in an automobile accident Dec. 30, 1960.

Dr. Frederickson was a general practitioner and a partner in the Glencoe Veterinary Hospital.

★**Charles J. Goubeaud** (COR '28), 58, Bayside, Long Island, N.Y., died June 22, 1960. Dr. Goubeaud was a small animal practitioner

★**James E. Guthrie** (OSU '38), 50, of Beltsville, Md., died in an automobile accident Nov. 29, 1960.

Dr. Guthrie had worked for 20 years in Ashland, Ohio, before going to work in Washington, D.C., 10 months ago.

E. Lawrence Hackney (CVC '18), 67, Temple, Texas, died Nov. 17, 1960.

Dr. Hackney had maintained a practice in Temple until his retirement in 1951. He had been ill about 9 years.

A. F. Hanna (SF '12), 72, Ferndale, Calif., died Oct. 3, 1960.

Dr. Hanna had retired in 1948. He had maintained practices in Fortuna and Ferndale, Calif., and had served the state of California as a deputy state veterinary inspector and as a field veterinarian in the Division of Animal Industry. He had worked toward controlling bovine tuberculosis and brucellosis in Humboldt County, Calif.

★**Edward R. Holland** (MIN '56), 34, Caledonia, Minn., was killed in an automobile-tractor accident, Nov. 19, 1960. Dr. Holland was a general practitioner

G. M. Jose, 82, McCool, Neb., died in October, 1960.

Dr. Jose had been honored by McCool residents last March for 50 years of service to the area. He began practicing in Nebraska in 1880.

James F. Methvin, 84, a retired veterinarian of Little Rock, Ark., died Nov. 20, 1960.

Ernest W. Paulsen (ISU '31), 51, Hartley, Iowa, died Oct. 3, 1960. Dr. Paulsen had practiced in Hartley for 29 years.

Women's Auxiliary

Arkansas

New officers of the Women's Auxiliary to the Arkansas V.M.A. are: (left to right) Mrs. C. S. Whitmore, Harrison, vice-president; Mrs. L. D. Stubbs, Russellville, president; and Mrs. George Vickers, Batesville, secretary-treasurer.

WOMEN'S AUXILIARY ELECTS NEW OFFICERS.—New officers of the Women's Auxiliary to the Iowa V.M.A. are: Mrs. Lester Proctor, Oelwein, president; Mrs. R. A. Leeper, Des Moines, president-elect; Mrs. Robert Haxby, Clarinda, vice-president; Mrs. James Barclay, Brooklyn, secretary; and Mrs. Stanley Hendricks, Des Moines, treasurer.

Nebraska

MEMBERSHIP DRIVE REPORTED SUCCESSFUL AT MEETING.—The highlight of the meeting of the Women's Auxiliary to the Nebraska V.M.A. was the report of the success of the association's current membership drive.

As a result, there are 29 new members of the auxiliary. Total membership is now 130.

The meeting was held Dec. 7-9, 1960, at the Hotel Cornhusker, Lincoln. There was an attendance of 55 at the business session.

Iowa

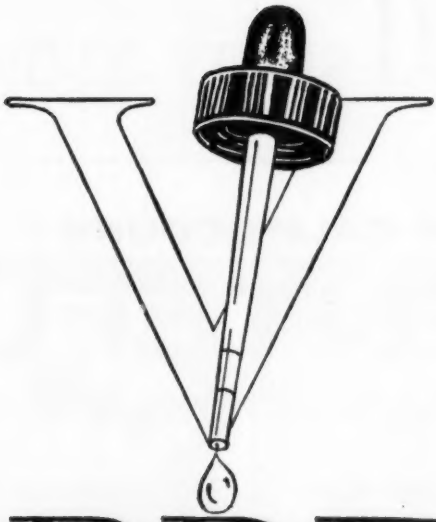
AUXILIARY LAUNCHES FULL-SCALE PROGRAM TO DISTRIBUTE "VETERINARY MEDICINE AS A CAREER."—Through the work of the Women's Auxiliary to the Iowa V.M.A. and a contribution from the Iowa V.M.A., "Veterinary Medicine as a Career" will soon be placed in every high school in Iowa.

The women's auxiliary was responsible for working out the mechanics of the project, and the Iowa V.M.A. underwrote the cost.

In a letter addressed to Iowa high school superintendents, the auxiliary requested that "Veterinary Medicine as a Career" be placed in the school library. The letter also offered assistance from the Iowa V.M.A. in securing career day speakers and additional information about the field of veterinary medicine.

Wisconsin

Leaders of the Women's Auxiliary to the Wisconsin V.M.A.'s Research Fund Campaign are shown at their meeting January 25 making last minute plans for the drive. They are: (left to right) Mrs. Alva Kolman, Waterloo; Mrs. David Fruit, Meaton; Mrs. Daniel Paradee, state chairman, Hustisford; Mrs. Wills Thompson, Plattville; and Mrs. Quentin Metzig, Oshkosh.



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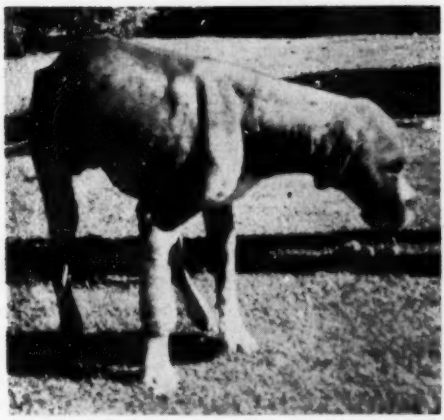

Fig. 1—Photograph of dog showing general weight loss and enlargement of the right foreleg.

Fig. 2—Radiograph, medial view, of right foreleg showing exostosis of the radius.

History.—A female Boxer-type dog, 18 months old, native to Phoenix, Ariz., was lame in the right front leg. The leg was abnormally sensitive upon palpation above the carpal joint but there were no signs of trauma nor were bone changes found radiographically. The dog's appetite was good.

Four weeks later the dog was returned with generalized weight loss, fever, and a sensitive swelling above the right carpus at the site of the previous soreness (fig. 1). Radiographs of the affected leg at this time showed marked bony proliferation (fig. 2). The complement-fixation test for coccidioidomycosis revealed a 3+ reaction to a 1:64 serum dilution. Euthanasia was recommended. At necropsy there were granulomatous lesions in the involved leg, in the lungs, and in the mediastinal lymph nodes.

Here Is the Diagnosis

(Continued from preceding page)

Diagnosis.—The case history, clinical findings, and radiographs were indicative of generalized and skeletal coccidioidomycosis.

Comments.—In Arizona, at least 200 cases of canine coccidioidomycosis are diagnosed annually and probably more than twice this number of dogs either die or recover from the disease without ever being brought to the attention of a veterinarian.[1] Modern travel brings animals from infected areas within reach of every veterinary practice in America.

Fig. 3—Map of the United States showing darkened areas where coccidioidomycosis is regularly found.

Diagnostically, coccidioidomycosis must be differentiated from a wide variety of conditions affecting the respiratory, skeletal, and nervous systems. The course of this disease is usually subclinical and ranges from acute to chronic; it usually begins with obscure or vague pulmonary signs. In rare instances, it progresses into primary coccidioidal granulomatosis which may spread to the skin, skeleton, or brain. Pulmonary granuloma is accompanied by persistent fever, cough, and variable "snow flurry" or "coin type" radiodensity of the lung fields.

The lesions in the skeleton are predominantly osteogenic and resemble osteosarcoma. In the brain, they cause encephalitis; in the skin, the lesions are wartlike and contain pus and serum.

Coccidioidomycosis, commonly referred to as valley fever or cocci, was first diagnosed in Argentina in 1892. In 1894, it was recognized in California.[2] Now several million persons in the semiarid areas of southwestern United States, including regions of California, Arizona, Nevada, Utah, New Mexico, and Texas (fig. 3), have acquired coccidioidomycosis.[3] Fortunately, the infection is generally mild and death from it is uncommon. Most mammals, including man, cattle, sheep, dogs, horses, burros, swine, desert rodents, llamas, chinchillas, American monkeys, and mountain gorillas have been known to have the infection.

Valley fever fungus (*Coccidioides immitis*) is a natural soil saprophyte of the arid and semiarid areas of North and South America where there are high summer and winter temperatures and a rainfall of 5 to 20 inches per year. The organism, besides flourishing in warm, dry areas, has the ability to multiply in the tissues of warm-blooded mammals. Once the infection is overcome, the body has lasting immunity against it.

This case report was prepared with the assistance of Wayne H. Riser, D.V.M., M.S., Kensington, Md.

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[1]Reed, R. E.: Coccidioidomycosis in Animals. Arizona Pub. Health News (March-April, 1959): 21.
[2]Maddy, K. T.: Foreword. Arizona Pub. Health News (March-April, 1959): 3.
[3]Smith, C. E.: Public Health Significance of Coccidioidomycosis. Arizona Pub. Health News (March-April, 1959): 6-9.

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1. Jones, S. V.; Belloff, G. B., and Roberts, H. D. B.: Vet. Med. 51:413 (Sept.) 1956.

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Public Relations

Image of a Profession

Public relations occupies a prominent position in current veterinary medical literature. Veterinarians are talking about the "image" of their profession, and are discussing among themselves how this image can be interpreted to allied professions and the public.

What is the nature of the image that the profession recognizes as truly its own?

Unity in Multiformity

An image is the product of many activities—technical, physical, and mental. It consists of countless brush strokes. It combines and harmonizes many colors. It has fine shadings, stark contrasts. It has perspective and depth. Every single line, every speck of color, the finest shading are essential to create the intended impression. An image achieves unity and meaning by closest attention to detail.

The image of veterinary medicine fulfills these requirements. The profession is complex, multifaceted, charged with many responsibilities, devoted to numerous tasks. Yet, this complexity is not fragmentation; it portrays the unity of purpose and endeavor of a growing and vigorous profession.

Creating the Image

The image of the veterinary medical profession—in its shadings, brushstrokes, and colors—arises out of the relations established by the veterinarian with his clients, and by veterinarians collectively, with the local community. The recognition of the veterinary profession as an essential national asset can never exceed the sum total of recognition accorded the individual veterinarian and the local veterinary medical association.

An unqualified belief that the trained public relations expert can *create* the image of veterinary medicine is flattering for the public relations man, but dangerous for the profession. The veterinarian who considers a nation-wide television show on veterinary medicine, or a steady flow of articles to national magazines, the only means of achieving recognition of his profession has been bedazzled by the glamour of public relations into forgetting that he himself is the opinion-making or opinion-breaking factor in any veterinary public relations program. Radio and television shows, newspaper releases, exhibits, magazine articles, films, and lectures intending to portray the high standards of the veterinary profession must reflect accurately the high standards of *veterinarians* to be convincing.

Projecting the Image

The ultimate responsibility, then, of relating the profession's image to the public rests with the individual practitioner. How can the national veterinary medical association assist and guide the veterinarian in making known and interpreting the profession's image to the public? Principally, by assuming the public relations responsibilities which exceed the facilities and competence of the individual and of associations representing him for more effective group action on both the local and the state level.

Understood and accepted in this light—as shared and delegated responsibilities—the public relations responsibilities of the AVMA are numerous and varied. They range from the development of speech kits for use in local career conferences, to the preparation and dissemination of press releases interpreting the profession's actions and viewpoints to the public. In the future, this column will be largely devoted to reports about how and by which means the Association relates the image of the profession to the public.

From time to time, these reports will be supplemented by, or replaced with, observations on current events and developments as they affect that image of the profession. It is hoped that such information, as it records and analyzes public relations on the national level, will stimulate the reader to responsible participation in forming the image of a profession.

H. R. KUEHN
Director, Public Information

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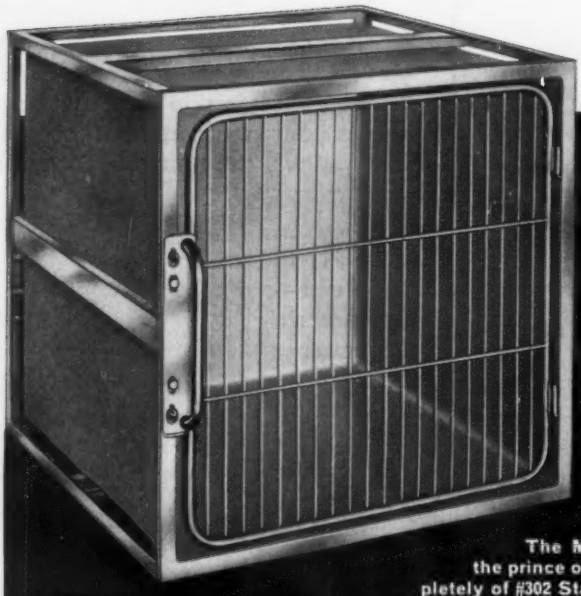

A C S

ANIMAL CAGES

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- All Stainless Steel Construction
- Completely Smooth Inside
- All Inner Edges and Corners Rounded
- Attractive in Appearance

The Model ACS–Stainless is truly the prince of all animal cages. Made completely of #302 Stainless Steel (18-8) with an all welded design that eliminates the use of solder. Inside surfaces are completely smooth, and all corners and wall-floor junctions are rounded to prevent any collection of dirt and animal excretions. Unit is mounted in a frame of mild angle steel with pre-drilled holes for easy tiering and assembly into multi-cage units.

Models ACS–Stainless and Model S-G "Thrift-Line" are available in six standard sizes from 24" wide, 30" high, 30" deep thru 48" wide, 36" high 30" deep. Other sizes to your specifications.

NEW *"Thrift-Line"*

MODEL S-G

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The Model S-G offers a new low price range in animal cages by combining the durability of 302 stainless steel in the lower section with the economy of Galvanneal in the upper section. The same excellence of manufacture, design and basic advantages of the Model ACS-Stainless have been retained in the Model S-G.

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J. F. Smithcors, D.V.M., Ph.D.

History of the AVMA

1905

At the annual meeting in Cleveland, President M. E. Knowles noted, The usefulness of the veterinarian is increasing rapidly as the lay public more fully recognizes the value of the educated veterinarian's services, not merely as a practitioner alleviating the suffering of our domestic animals, but in the still higher sphere of the sanitarian." And congratulating the state of Pennsylvania for having made Leonard Pearson a member of the state board of health, he said, "It is largely within our power to see to it that every State in the Union has upon its board of health a capable veterinarian."

Both the papers and the clinic probably would have pleased Dr. Merillat; papers were presented by W. L. Williams on spavin, R. C. Moore on neurectomy, M. H. Reynolds on stable ventilation, and L. A. Klein on scours. The clinic was described as "very near to being a perfect one: in fact, so near that we heard a prominent opponent of this section of the annual meeting's programme acknowledge that he was mistaken; that properly conducted he believed they were valuable . . . educational, and interesting." An evening session included an hour-long report by Dr. Merillat on "Accidents and Sequellae of Surgical Operations," during which: "Not a sound could be heard save the author's voice, so intent were his auditors to catch every word, and when he had concluded there ensued a discussion which has probably never been equalled in this country."

In a report on "The Profession and the Advancement of Science," D. A. Hughes inquired, "Is the eagerness to receive knowledge on the part of our membership commensurate with the eagerness to give knowledge? . . . Our books are in sharp contrast with the great modern books on human medicine . . . [and] many of the articles on veterinary topics . . . are commonly very faulty. . . . They are apt to be either a mouthing of old material or repetition of the commonest things in textbooks. . . . We do not prize enough the opportunities we have to perform post-mortem examinations . . . pathological material is, through carelessness or indifference, constantly being thrown away and the knowledge lost to science.

In accordance with the 1904 revision of the bylaws, an honor roll was established, honoring 25-year members. Three men qualified. William Dougherty of Baltimore, and past-presidents John F. Winchester of Massachusetts and James L. Robertson of New York. The death of past-president William B. E. Miller was noted.

William H. Lowe

William Herbert Lowe was elected president and George R. White of Tennessee was elected treasurer to fill the post vacated by Dr. Lowe. John J. Repp was re-elected secretary.

Operations for spavin, stringhalt, lameness, roaring, quittor, and tendonitis in horses were demonstrated by L. A. Merillat, W. H. Hoskins, J. W. Adams, M. H. McKillip, W. L. Williams, and others.

✦ ✦ ✦

WILLIAM HERBERT LOWE joined the Association in 1886, and served as treasurer from 1897 until 1905, when he was elected president. In 1907 he became chairman of the Executive Board and, in 1911, an honor roll (25-year) member. Promient in veterinary matters in New Jersey, he was the author of the practice act, adopted in 1902, and for 10 years was an executive member of the board of examiners. He is also credited with consolidating the several local associations in New Jersey into a strong state association. In nominating Dr. Lowe for the presidency, R. R. Bell characterized him as ". . . one who loves his profession next to his God, and this association next to his beloved profession."

Dr. Lowe continued to be active for another 25 years after his term as president and contributed to the AVMA JOURNAL as late as 1930. But the veterinary journals have recorded only the date of his death, Dec. 31, 1933.

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Intravenous antistress therapy for large animals

100 U.S.P. units of ACTH in 500 cc. of a 50% glucose solution.

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Detroit Invites You to 1961 Annual Meeting

Detroit, host city to the 1961 AVMA Annual Meeting, is usually thought of as an industrial giant among cities. It is that. And it is more. It is a center of commerce, culture, learning, and entertainment. Its nearly 2 million workers go home to a way of living the comfort and expansiveness of which few cities can match. Along with the world's greatest concentration of industrial power, one may find white-tailed deer roaming through virgin woods within the city limits.

Founded in 1701 by Antonine Cadillac, Detroit is now the fifth largest city in the United States and the oldest continuous settlement in the Midwest. The word "Detroit" in French means "city of the straits." In the heart of the continent, Detroit is a world port. Its river is the world's busiest commercial waterway. Three major league ball teams make Detroit their home, as do a symphony orchestra of great repute and shops of world renown.

The city that put the world on wheels will be an exciting place to visit for thousands of veterinarians and their families during the 98th Annual Meeting of the AVMA, August 20-24. Here is a thumbnail sketch of some of the things which make Detroit a good place to hold a meeting:

THE AUTOMOTIVE INDUSTRY—Ten makes of cars, 5 of trucks, and half of America's production of automobiles and parts roll off Detroit-area assembly lines. All plants welcome visitors.

OTHER INDUSTRY—Notable among other basic manufacturers in Detroit are the Borroughs Corporation, Parke Davis and Company, and the Hiram Walker Distillery (in Windsor, Ont.).

CANADA—By tunnel or bridge, or by 15-cent ferry ride—a few minutes and you're abroad. If you drive, bring auto registration papers; if you are a naturalized citizen you will need citizenship papers to cross into Canada.

COBO HALL—Massive center of the AVMA scientific sessions and exhibits. One of the world's largest exhibition buildings, it occupies 10 acres at the western end of Detroit's Civic Center and is part of a $100 million revitalization of Detroit's riverfront.

GREENFIELD VILLAGE AND THE HENRY FORD MUSEUM—American history comes to life in a 200-acre panorama. The actual buildings in which history was made have been restored, with tools, furniture, and surroundings that were typical of 2 generations past.

BELLE ISLE—Detroit's unique island park is always a favorite for out-of-towners. The 1,000-acre park offers swimming, canoeing, boating, tennis, golf, and even summer-evening band concerts in the Remick Shell. Located here also is the Children's Zoo where animals live in the surroundings of a Mother Goose theme. One of the great fresh-water aquariums is also located here.

CRANBROOK—Six famous cultural institutions and schools grouped in a rural setting

At the left is the Detroit skyline with Cobo Hall, the $54,000,000 auditorium, in the foreground. Cobo Hall offers 10 acres of unobstructed exhibit space and accommodations for parking more than 2,000 cars on the roof and between levels.

Just north of Detroit in Bloomfield Hills is Cranbrook, a world-famous combination of beautifully-landscaped park and museums, schools, and churches. The peristyle breezeway in this photo links the library of the Cranbrook Academy of Art and the Cranbrook Museum of Art.

famous for its great architecture, sculpture, and landscaping.

FORD ROTUNDA—The largest hospitality center in the world. Admission to spectacular dioramas and animated displays is free to guests.

DETROIT INSTITUTE OF ARTS—Outstanding examples of the plastic arts from every period and culture are hung in this museum.

WAYNE UNIVERSITY—In the midst of the city stands one of the largest of the country's universities. Also within the city limits is the University of Detroit.

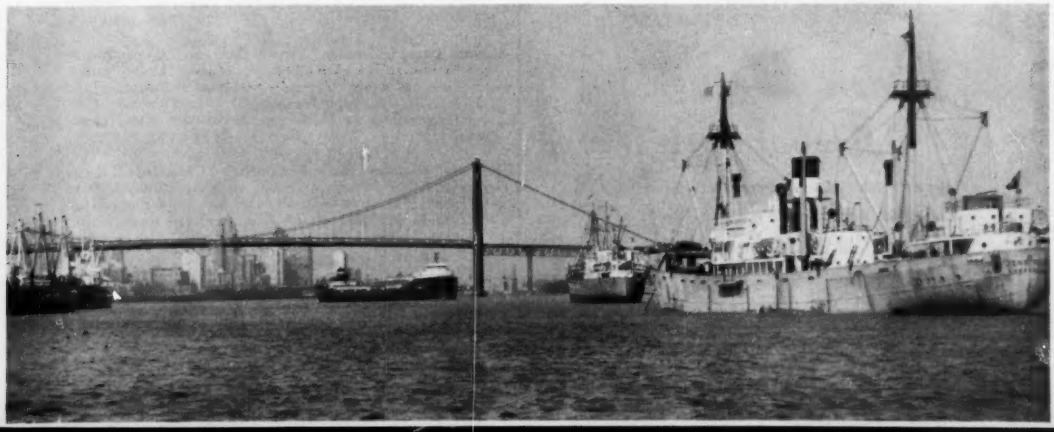
DETROIT ZOO—A unique miniature railroad transports patrons through open-air, barless settings.

DETROIT RIVER—World's busiest waterway, home waters of world's largest pleasure fleet. Cruise it in Bob-lo excursion steamers.

Other attractions are: J. L. Hudson—world's second largest department store; Fort Wayne—century-old fort, now museum of military history; Metropolitan Beach—world's largest fresh-water beach; International Institute—center of folk-art and culture of Detroit's scores of nationalities; Detroit Public Library—architectural gem, holds a million volumes; Northland—ultra-modern, beautiful shopping center with sculptures, fountains, and landscaped malls to provide carefree shopping atmosphere; Expressways—some 20 miles of depressed streets whirl motorists along at open highway speeds (intersecting near heart of city is a 5-level tapestry of bridges—expressway network, when completed, will total 90 miles); Rackham Building—Detroit home of 41 technical societies; Masonic Temple—world's largest Masonic edifice; Shrine of the Little Flower—built by pennies of radio listeners.

More detailed information on housing, the convention, transportation to and around Detroit will be published in future issues of the JOURNAL. Also featured will be stories on vacation possibilities in the Michigan and Canadian areas.

Though more than a thousand miles inland, Detroit is a port city for ocean ships and the nation's second largest foreign trade gateway. In the background is the Ambassador Bridge which links Detroit and Canada.



Coming Meetings

Notices of coming meetings must be received 30 days before date of publication.

March, 1961

Alabama Veterinary Medical Association. Annual meeting. Whitley Hotel, Montgomery, Ala., March 19-21, 1961. Dr. M. K. Heath, School of Veterinary Medicine, Auburn, Ala., secretary.

New Jersey Veterinary Medical Association. Hotel Claridge, Atlantic City, N. J., March 22-23, 1961. Dr. John R. McCoy, Bureau of Biological Research, Rutgers University, New Brunswick, N.J., secretary.

Pennsylvania, University of. Postgraduate short courses. School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa., March 27-30, 1961. Dean's Office, School of Veterinary Medicine, University of Pennsylvania, Philadelphia 4, Pa.

Indiana Veterinary Medical Association. Fourth symposium on therapeutic nutrition. State Board of Health Building, Indianapolis Ind., March 31, 1961. Dr. E. E. Slatter, 4131 Vera Dr., Indianapolis 20, Ind., chairman.

April, 1961

Washington State University. Thirteenth annual conference for veterinarians. School of Veterinary Medicine, Washington State University, Pullman, Wash., April 3-5, 1961. Dr. Hugh C. Butler, conference chairman.

Ohio Academy of Science. Annual meeting. University of Cincinnati, Cincinnati, Ohio, April 20-22, 1961. Mr. Kenneth B. Hobbs, 505 King Ave., Columbus 1, Ohio, executive secretary.

Animal Health Institute. 21st annual meeting. Mayflower Hotel, Washington, D.C., April 24-26, 1961. Dr. Guy A. Railsback, Cutter Laboratories, 4th & Parker Sts., Berkeley 10, Calif., president.

Southwestern Conference on Diseases in Nature Transmissible to Man. Eleventh annual conference Agricultural and Mechanical College of Texas, Memorial Student Center, College Station, Texas, April 27-28, 1961. Dr. F. P. Jaggi, Jr., Department of Veterinary Public Health, Agricultural and Mechanical College of Texas, College Station, Texas, conference chairman.

June, 1961

Texas, Agricultural and Mechanical College. Fourteenth annual conference for veterinarians. School of Veterinary Medicine, Agricultural and Mechanical College of Texas, College Station, Texas, June 1-2, 1961. Dr. R. D. Turk, Texas Conference for Veterinarians, School of Veterinary Medicine, College Station, Texas, conference chairman.

Kansas State University. Twenty-third annual conference for veterinarians. Little Theatre, Student Union Building, Kansas State University, Manhattan, Kan., June 11-13, 1961. Dr. John Noordsy, Dykstra Veterinary Hospital, Kansas State University, Manhattan, Kan., chairman.

Kansas Veterinary Medical Association. Semiannual business meeting. Student Union Building, Kansas State University, June 11-13, 1961. Dr. M. W. Osburn, 1525 Humboldt St., Manhattan, Kan., secretary-treasurer.

(*Continued on adv. p.* 42)

(Coming Meetings—continued from adv. p. 40)

Pennsylvania Veterinary Medical Association. Annual convention. Pennsylvania State University, State College, Pa., June 13-15, 1961. Dr. Richard C. Guise, 5399 Jonestown Rd., Harrisburg, Pa., president.

North Dakota State Veterinary Medical Association. Fifty-sixth annual meeting. Ray Hotel, Dickinson, N.D., June 18-20, 1961. Dr. C. B. Bjornson, North Dakota State University, Fargo, N.D., secretary-treasurer.

Maritime Veterinary Associations. Twelfth annual joint conference. Mount Allison University, Sackville, N.B., June 27-29, 1961. Dr. R. McG. Archibald, P. O. Box 310, Sackville, N.B., Can.

Nebraska, University of. Swine Repopulation Conference. Veterinary Science Department, University of Nebraska, Lincoln, Neb., June 28-29, 1961. Dr. Crosby Howe, Department of Veterinary Science, University of Nebraska, Agricultural Experiment Station, Lincoln 3, Neb., chairman.

August, 1961

American Veterinary Medical Association. Ninety-eighth annual meeting. Sheraton-Cadillac Hotel, Detroit, Mich., Aug. 20-24, 1961. Dr. H. E. Kingman, Jr., 600 S. Michigan Ave., Chicago 5, Ill., executive secretary.

Foreign Meetings

Fourth International Congress on Animal Reproduction. The Hague, Netherlands, June 5-9, 1961. For additional information contact: the Secretariat of the Fourth International Congress on Animal Reproduction, 14, Burgemeester de Monchyplein, The Hague, Netherlands, Dr. L. Hoedemaker, secretary to the organizing committee.

Eighth International Congress of Animal Husbandry. Hamburg, Germany, June 13, 1961.

Twelfth World's Poultry Congress. Show Grounds of the New South Wales Royal Agricultural Society, Sydney, Australia, Aug. 13-18, 1962. Dr. Cliff D. Carpenter, chairman, U.S. Participation Committee, 1207 Emerald Bay, Laguna Beach, Calif.; Dr. A. William Jasper, secretary, c/o AFBF, 2300 Merchandise Mart, Chicago 54, Ill.

Two Minutes Sufficient for Achieving Conception in the Bitch

The first fraction of a dog's ejaculum, the clear fluid from the mucosal glands of the urethra, contains no spermatozoa and takes about ½ minute to be voided. The second fraction, containing the spermatozoa, takes about 1 or 2 minutes to be ejaculated. The third fraction of the ejaculum from the prostate gland, which contains no spermatozoa but is an activator of the spermatozoa and supplies the greater volume of the ejaculum, may take from 5 to 30 minutes to be voided. It is not necessary to have any of the third fraction present for conception, although it serves as an activator and also as bulk to be washed forward into the uterus by the rhythmical action of the vagina. If the first 2 fractions have been deposited well forward in the vagina, there is a good chance of conception even though mating may have lasted only 1½ minutes.—*J. South Afric. Vet. M.A., (March, 1960): 141.*

New Influenza Journal Features Animal Studies

An *Annotated Bibliography of Influenza,* a quarterly publication of the American Institute of Biological Sciences (AIBS), 2000 P St., N.W., Washington 6, D.C., is now available at $2.00 per copy. The publication is a bibliographic record of articles published on influenza and related subjects in periodicals in the United States and abroad. Approximately 2,600 available journals are being searched in this project. The AIBS, publisher of the book, represents an estimated unduplicated total of 80,000 biologists. Each issue is expected to contain a section on animal studies. In the first issue, a report of experimental influenza in dogs and a study of enteric porcine virus-producing encephalomyelitis and pneumonitis in baby pigs are listed.

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There is obviously a definite advantage in the use of a disinfectant in your practice that does not leave an obnoxious odor about the clothing, person or premises.

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ROCCAL is eminently useful as a germicide. It is not for surgical use but is intended for the general disinfection of floors, walls, kennels, stables, milking equipment, operating tables, furniture, wash tubs, eating and drinking utensils.

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Solution Veterinary SQUEEJET® and Suppositories Veterinary

- **reduces services per conception**
- **shortens intervals between calvings**

Impaired fertility in cows, commonly accepted to result from non-specific genital infection, responds dramatically to the 2-step treatment method with FURACIN. In one 3-year study involving treatment with FURACIN Suppositories Veterinary, of approximately one-half of 530 "problem breeders": "The average number of services per conception was 1.88 in the treated and 2.85 in the untreated cows. The average number of days between calvings was 385 in the treated and 447 in the untreated animals."[1]

In a study with 85 subfertile dairy cows, 61.7% of 34 treated with an intra-uterine injection of FURACIN Solution Veterinary conceived at first service, while only 19.3% of 31 treated in an identical manner with 10% saline solution conceived at first service; 40% of 20 non-treated controls conceived at first service.[2]

FURACIN 2-Step Method for Impaired Fertility

STEP 1. During estrus, instill, aseptically, the contents of 1 to 3 SQUEEJETS (30 to 90 cc.) of FURACIN Solution Veterinary into the uterus by means of a uterine pipette.

STEP 2. During the following 3 weeks, insert 1 FURACIN Suppository Veterinary into the anterior portion of the vagina 3 times each week on alternate days.

The cow may then be bred during the next estrus.

Supply: FURACIN Solution Veterinary SQUEEJET (30 cc. each), boxes of 12; FURACIN Suppositories Veterinary, boxes of 12.

1. Vigue, R. F., et al.: J. Am. Vet. M. Ass. 134:308 (April 1) 1959.
2. Vigue, R. F.: Personal communication.

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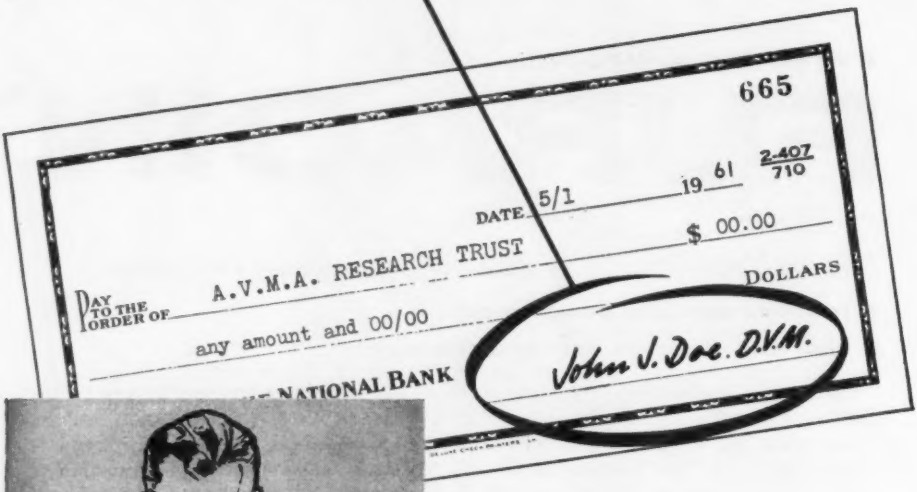

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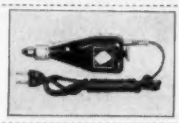

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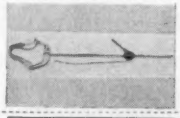

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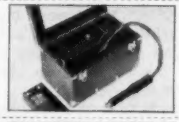

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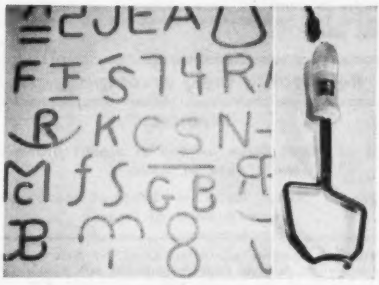

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COMMERCIAL WANT ADS—$5.00 for the first 25 words, 25 cents for each additional word; $1.00 for use of box number. (See paragraph above for total word count.)

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DEADLINES

1st of month issue — 8th of month preceding date of issue.

15th of month issue — 22nd of month preceding date of issue.

Names of classified advertisers using key letters can not be supplied. Address your reply to the box number, c/o JOURNAL of the AVMA, 600 S. Michigan Ave., Chicago 5, Ill., and it will be sent to the advertiser.

Wanted—Veterinarians

Wanted—young single veterinarian with small animal experience for temporary (6 months) position in New Jersey. Address Box C 19, JOURNAL of the AVMA.

Wanted—experienced veterinarian to head small animal charity clinic in Midwest's largest privately-supported humane organization. Begin April 1 or sooner. Illinois license required. Clinic maintains excellent relations with veterinary associations. Contact Anti-Cruelty Society, 157 W. Grand, Chicago 10, Ill.

Wanted—1961 graduate for predominantly large animal practice. Opportunity for partnership. Desire someone interested in permanent situation. Splendid opportunity in southern United States. Address Box C 11, JOURNAL of the AVMA.

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An unusual opportunity for ambitious man to join rapidly—growing company now a leader in its field.

Degree in veterinary medicine, experience in poultry pathology, or graduate training in pathology or microbiology necessary. Will immediately assume responsibility for a diagnostic laboratory, act as a company consultant to poultry growers, and work with sales force. Salary commensurate with experience and background. Write stating background, present position and salary, qualifications. Address Box C 14, JOURNAL of the AVMA.

Wanted—associate veterinarian with 2 or more years' experience for small animal practice in Summit, N. J., dog and cat hospital. Salary open. Address Dr. J. B. Engle, Box 432, Summit, N. J.

Wanted immediately—veterinarian for growing suburban practice. Excellent potential; modern, well-equipped hospital in Maryland. Salary, percentage, partnership. Address Box B 68, JOURNAL of the AVMA.

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Position available for graduate veterinarian. General practice in New York State. Open May 1. Address Box A 22, JOURNAL of the AVMA.

Wanted—graduate for Chicago suburban practice from June to October 1. Address Gillispie Animal Hospital, 7560 Central, River Forest, Ill.

Alert veterinarian wanted for permanent position in AAHA hospital in Washington, D. C. suburbs. Small animal practice. Good salary, working conditions, and excellent future. Send full details. Address Box A 55, JOURNAL of the AVMA.

Wanted—Positions

Veterinarian with family, age 40, 10 years' experience in own dairy practice, desires to associate with group practice in Protestant community. Special interest—dairy cattle (sterility and mastitis control). Address Box C 5, JOURNAL of the AVMA.

Wanted—associate position in general practice in Kansas, Nebraska, Illinois, Iowa, Minnesota or Wisconsin. Graduate (KSU '58), married. Address Box C 3, JOURNAL of the AVMA.

Florida position desired by 1960 graduate, veteran, married. Experience in small and large animal work. References available. Will be in Florida this spring for personal interviews. Available May 1. Address Box C 7, JOURNAL of the AVMA.

Graduate (ISC '51) with 10 years' experience in own general practice, desires change. Prefer field work for biological or pharmaceutical manufacturer or would consider group practice. Eastern states preferred. Address Box B 7, JOURNAL of the AVMA.

Veterinarian with 25 years' experience in general practice desires work in veterinary biological or diagnostic laboratory. Address Dr. Emery H. Enge, Comfrey, Minn.

Veterinarian, experienced in small animal practice, licensed in New York and New Jersey, is available for relief work in New Jersey and New York metropolitan area. Address Box C 9, JOURNAL of the AVMA.

(Continued on adv. p. 50)

Biosol-M*

(200 mg. neomycin sulfate,
2 mg. methscopolamine bromide per cc.)

blocks

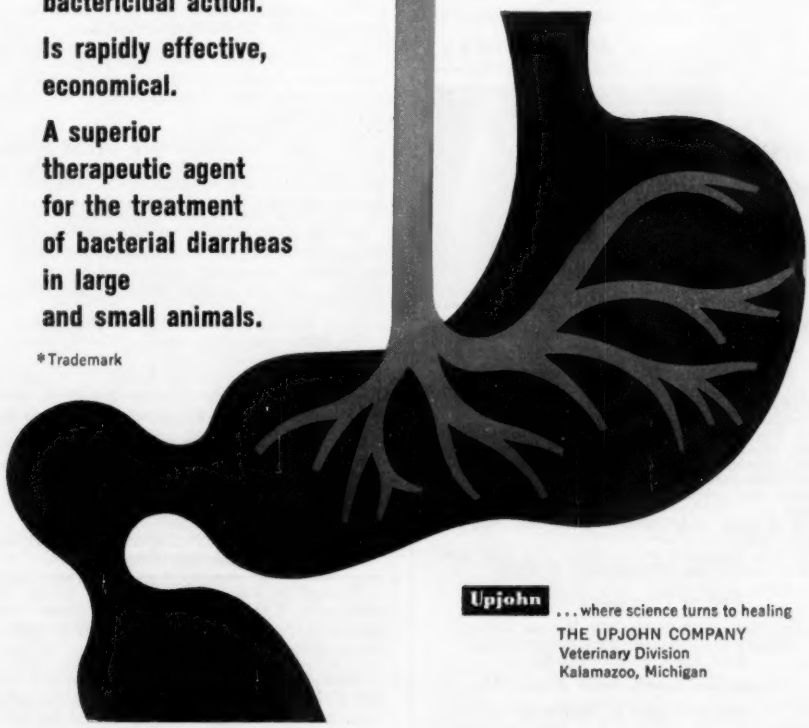
vagal nerve impulses to inhibit hypersecretion and hypermotility in the gut.

Controls intestinal pathogens through broad-spectrum bactericidal action.

Is rapidly effective, economical.

A superior therapeutic agent for the treatment of bacterial diarrheas in large and small animals.

*Trademark



Upjohn ...where science turns to healing

THE UPJOHN COMPANY
Veterinary Division
Kalamazoo, Michigan

(Classified ads—continued from adv. p. 48)

Widow, age 47, desires position as veterinarian's receptionist and assistant. Live in preferred. Salary required—$50. Excellent references. Address Mrs. C. M. Cross, 2600 S. W. 56th Ave., West Hollywood, Fla.

Veterinarian—competent commercial artist specializing in anatomical and veterinary medical illustration with ability to write. Years of experience in general practice, poultry diagnostic, technical, public relations and administrative work. Excellent man for veterinary advertising, field research, or scientific expeditions. Address Box C 13, JOURNAL of the AVMA.

For Sale or Lease—Practices

For sale—established mixed practice offered for quick sale. Gross—$30,000. Sale includes hospital and house situated on 1 acre on major highway, equipment, instruments, drugs, etc. Missouri license required. Real estate appraised. Easy terms. Address Box C 20, JOURNAL of the AVMA.

For sale—mixed practice in Michigan thumb area. Priced at real estate value of new clinic-house combination, $34,500. $17,000 to handle. Address Dr. R. C. Hervey, Cass City, Mich.

For sale—completely-equipped large and small animal hospital (70% large and 30% small). Average gross for the past 5 years over $30,000 yearly; gross for 1959 and 1960 over $35,000 yearly. Located in one of Montana's active cattle areas. Priced to sell. Terms can be arranged. Quitting practice for other interests. Address Box C 4, JOURNAL of the AVMA.

For sale—large animal practice in southeastern Wisconsin. Office, residence, 2-way radio. Address Box C 22, JOURNAL of the AVMA.

For sale or lease—modern veterinary clinic; 35 cages; living quarters. General practice in Kentucky blue-grass area. Residence. Opportunity for progressive veterinarian. Liberal terms. Address Box C 12, JOURNAL of the AVMA.

For sale or lease with option to buy—Wisconsin general practice with or without real estate. Address Box C 17, JOURNAL of the AVMA.

For sale—Indiana mixed practice in thriving community. Includes fully-equipped hospital. Priced at real estate value. Address Box B 13, JOURNAL of the AVMA.

For sale—Virginia practice in prosperous area. Equipped hospital, apartment, 2-way radio. Gross—$30,000. Reasonable terms. License required. Address Box C 16, JOURNAL of the AVMA.

For lease—Oklahoma small animal hospital. Buy drugs and equipment and lease building. Small investment, good net. Address Charles E. Doyle, D.V.M., practice broker, 4813 N. McArthur, Oklahoma City, Okla.

To lease—excellent small animal clinic; well-established clientele located in suburban Birmingham, Ala. Available after March 1. Contact direct. Address Mrs. Clyde Ulmer, Route 4, Box 910, Birmingham. Phone TRemont 1-4073 days or TRemont 1-4835 evenings.

For sale—Kansas mixed practice; building, equipment and drugs, priced at one year's gross. Small down; must sell. Address Charles E. Doyle, D.V.M., 4813 N. McArthur, Oklahoma City, Okla.

Wanted—Practices

Wanted to buy or lease—small animal hospital, preferably AAHA, in New York State. State full details, price, terms. Address Box C 18, JOURNAL of the AVMA.

Wanted to lease—Ohio small animal practice grossing $35,000 or more, with or without purchase option. Address Box C 6, JOURNAL of the AVMA.

Wanted to buy or lease—small animal hospital, preferably AAHA, in New York State. State full details, price, terms. Address Box C 18, JOURNAL of the AVMA.

Wanted—to purchase or lease small animal hospital in New Jersey, Maryland, Ohio, Indiana, Illinois or Michigan. Address Box C 8, JOURNAL of the AVMA.

Wanted—large animal or mixed practice in Illinois, Indiana or Wisconsin to purchase or lease with option. Will consider partnership. Address Box C 15, JOURNAL of the AVMA.

Experienced veterinarian desires to purchase or lease with option established mixed or small animal practice in Pacific Northwest, or would enter progressive group practice. Capital available. Address Box C 2, JOURNAL of the AVMA.

Wanted—to purchase or lease lucrative small animal practice in Ohio, Tennessee, southeastern, midwestern or western states. Capital and experience. Address Box C 1, JOURNAL of the AVMA.

Miscellaneous

For sale—Fisher x-ray and fluoroscope and all accessories, perfect condition. Very reasonable. Address Dr. S. Lipton, 303 W. North, Danville, Ill.

Pregnancy diagnosis in mares—45th to 150th day. Request mailing tubes: $7.00. Address Pregnancy Diagnostic Laboratories, Dysart, Iowa.

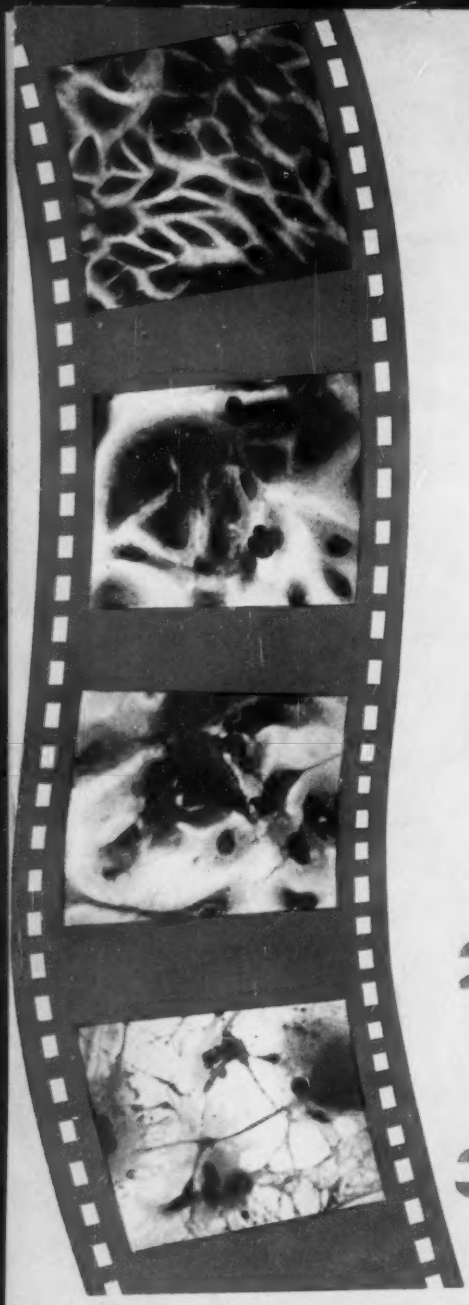
Egg in Pet Diets Often Overlooked

Eggs quite often are overlooked as a source of protein in the diets of pets, according to David C. Tudor (UP '51), College of Agriculture, Rutgers University. Dr. Tudor has been reminding his fellow practitioners of the value of an egg for breakfast, especially for dogs, cats and other small animals.

He calls attention especially to the nutritional value of a poached egg or egg in milk. He and others in the profession have found that sick animals and young puppies thrive on minced soft boiled eggs, and he further states that normal healthy animals preserve a lustrous sheen to the hair coat when they are fed nutritious, protein-rich eggs.

In his work as poultry pathologist at Rutgers, Dr. Tudor is well aware of the value of high quality protein in the diet of pets. If only a portion of the estimated 29 million cats and 26 million dogs received an egg for breakfast, the nutritional standards of our pets would be markedly improved, he says.

Index to Advertisers



In Your Distemper Immunization Program

"Be Cytogen® Sure"

Cytogen: Canine Distemper Vaccine, Modified Live Virus, Canine Tissue Culture Origin, Lyophilized . . . the first modified live virus vaccine produced on dog kidney cells.

1 Be sure of high antigenicity:

To the recognized superiority of a modified live virus vaccine, **Cytogen** adds increased effectiveness where it counts most . . . the strength, quality and antigenicity of the virus itself. As little as ten egg infectious doses of **Cytogen** virus protected susceptible pups from direct challenge[1]. By comparison, 64 to 250 $E.I.D._{50}$ of chick embryo origin virus are required to confer immunity[2].

2 Be sure of rapid response:

When distemper virus is grown in the Jen-Sal canine kidney cell system and becomes **Cytogen** virus, its ability to invade the dog is also enhanced. Susceptible test animals successfully withstood challenge with virulent virus as early as four days after vaccination with **Cytogen**[3].

3 Be sure of maximum stability:

Cytogen contains an exclusive stabilizing agent. With this stabilizer **Cytogen** virus has successfully protected dogs from virulent virus challenge after being artificially aged for a period equivalent to fourteen months of storage at room temperature[4]. For even greater superiority **Cytogen** is held well below freezing from the time it is produced until you receive it.

Cytogen is now available for immediate shipment from your Jen-Sal branch. Order now and "Be **Cytogen** Sure."

Package: 10 — 1 dose vials, with diluent

Clinical and Research References:

1. Sinha, S. K., et al, Studies on Canine Distemper Immunization with a Tissue Culture Vaccine. Vet. Med., Vol. 55, No. 4, April 1960.
2. Burgher, J. A., et al, The Immune Response of Dogs to Distemper. Cornell Vet., Vol. 48, No. 2, 1958.
3. Paton, I. M., et al, Progress in Distemper Immunization. Jen-Sal Small Animal Topics, August 1960.
4. Dept. of Biological Research, Jensen-Salsbery Laboratories. Unpublished Research Data.

another new and exclusive product of Jen-Sal *research!*

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